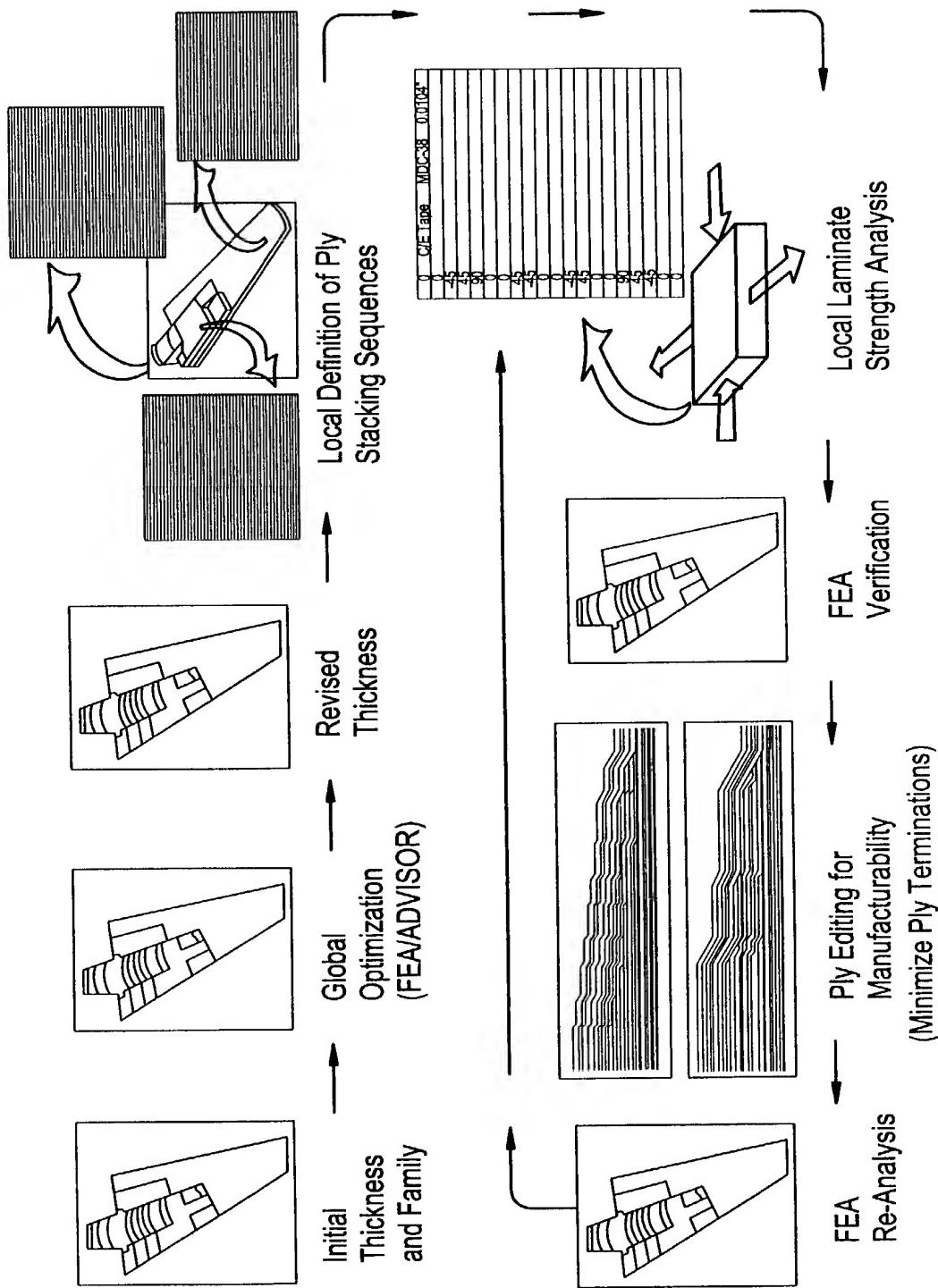
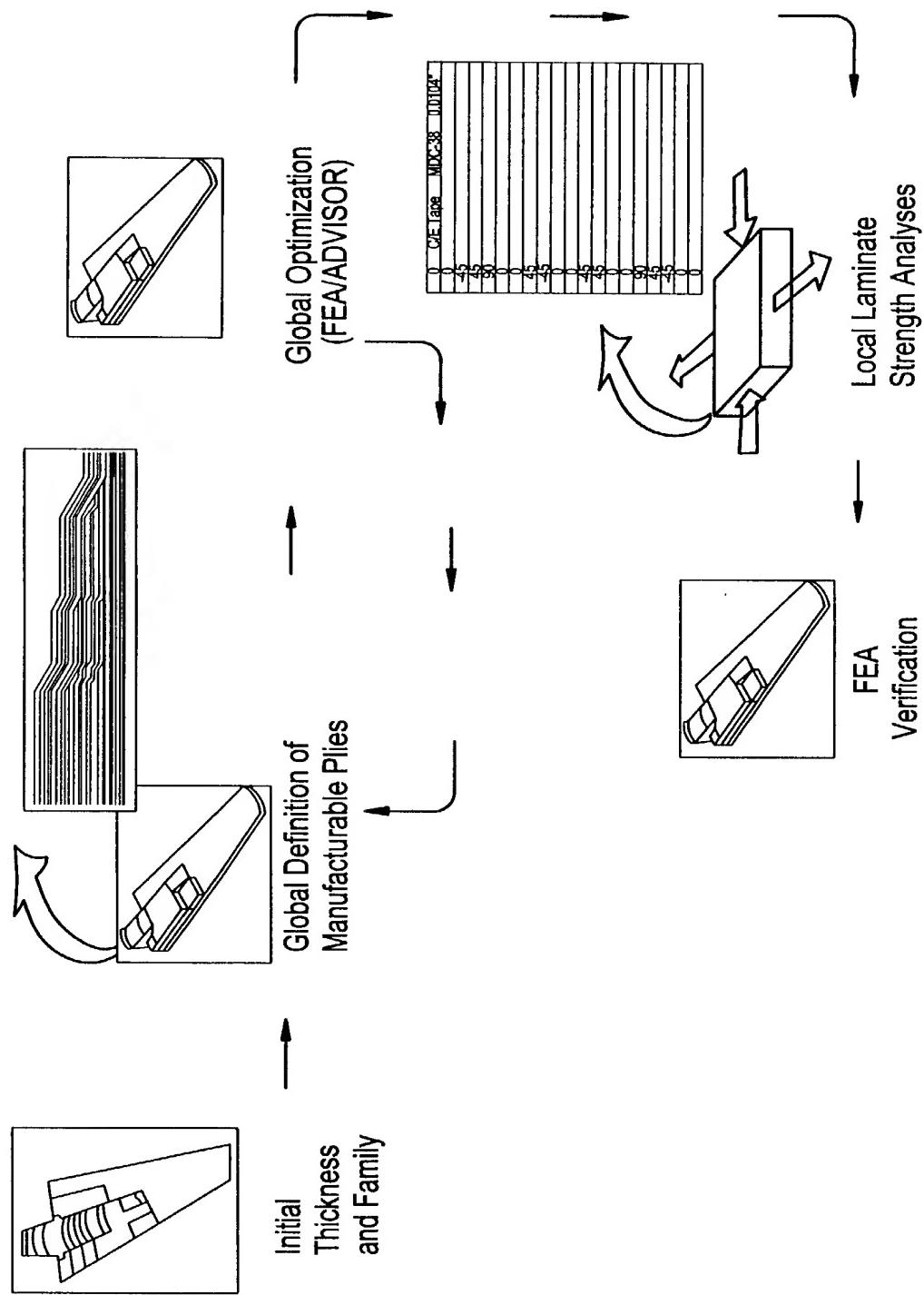


**FIG. 1**



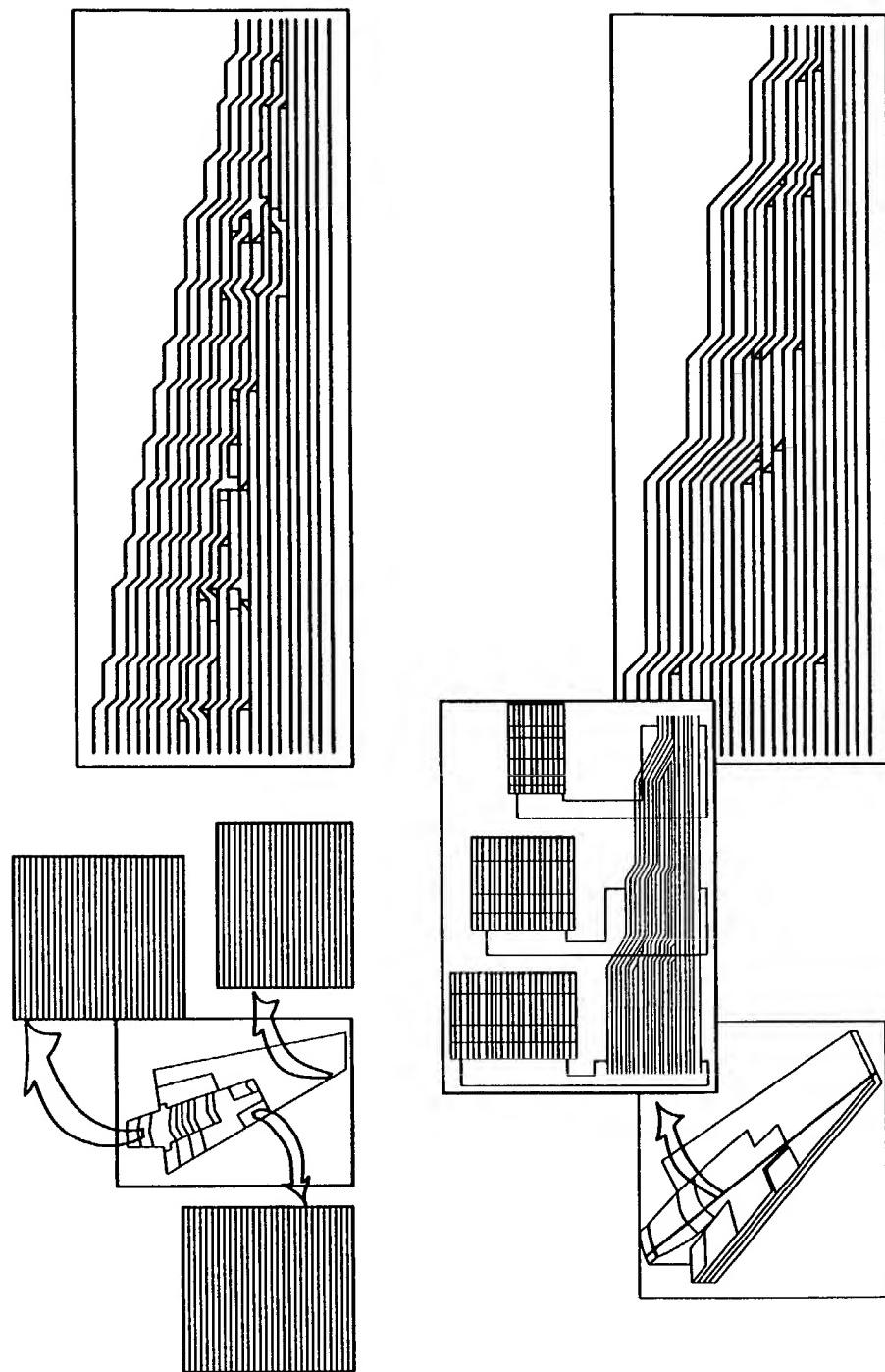
**FIG. 2**



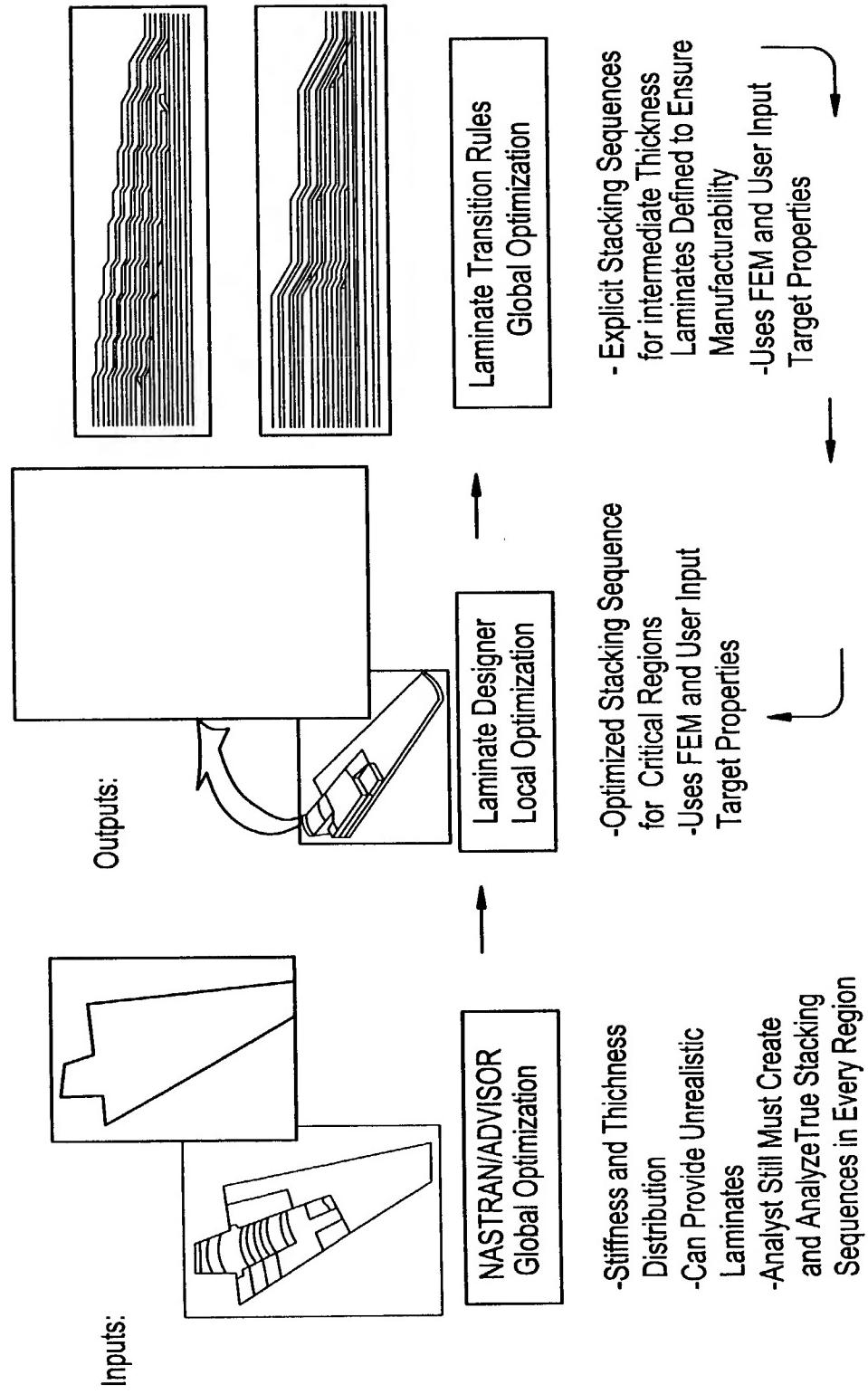
**FIG. 3**

Thickness (# Plies)	Potential Families	Axial	Stiffness (msi)	Shear	Poisson's Ratio
17	--	13.23	5.30	2.79	0.42
18	--	13.23	5.30	2.79	0.42
19	--	13.23	5.30	2.79	0.42
20	50.0/40.0/10.0	13.23	5.30	2.79	0.42
21	--	13.23	5.30	2.79	0.42
22	--	13.23	5.30	2.79	0.42
23	--	13.23	5.30	2.79	0.42
17	41.2/47.1/11.8	11.59	5.88	3.14	0.42
17	47.1/47.1/5.9	12.56	4.68	3.14	0.52
18	44.4/44.4/11.1	12.19	5.67	3.01	0.42
19	42.1/42.1/15.8	11.78	6.60	2.89	0.35
19	47.4/42.1/10.5	12.74	5.48	2.89	0.42
19	52.6/42.1/5.3	13.61	4.39	2.89	0.52
20	50.0/40.0/10.0	13.23	5.30	2.79	0.42
21	42.9/38.1/19.0	11.90	7.10	2.69	0.30
21	47.6/38.1/14.3	12.80	6.12	2.69	0.35
22	45.5/36.4/18.2	12.38	6.86	2.61	0.30
22	54.5/36.4/9.1	14.07	4.97	2.61	0.42
23	47.8/34.8/17.4	12.82	6.64	2.53	0.30
23	52.2/34.8/13.0	13.65	5.74	2.53	0.35
23	56.5/34.8/8.7	14.44	4.83	2.53	0.41

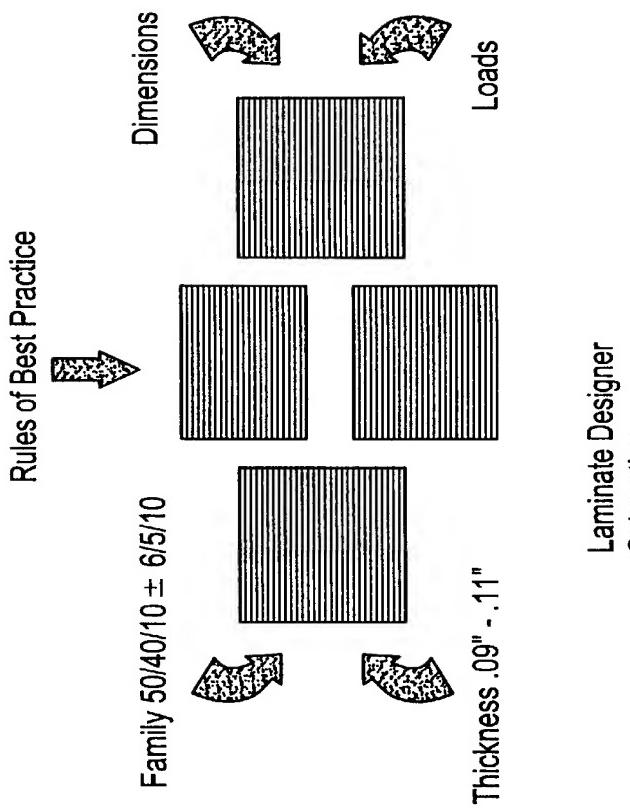
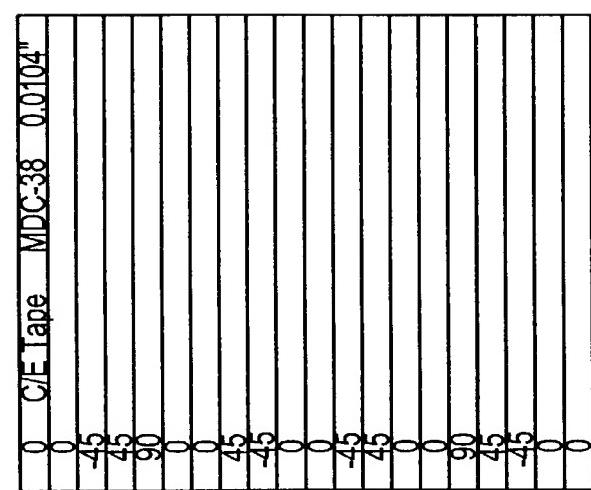
FIG. 4



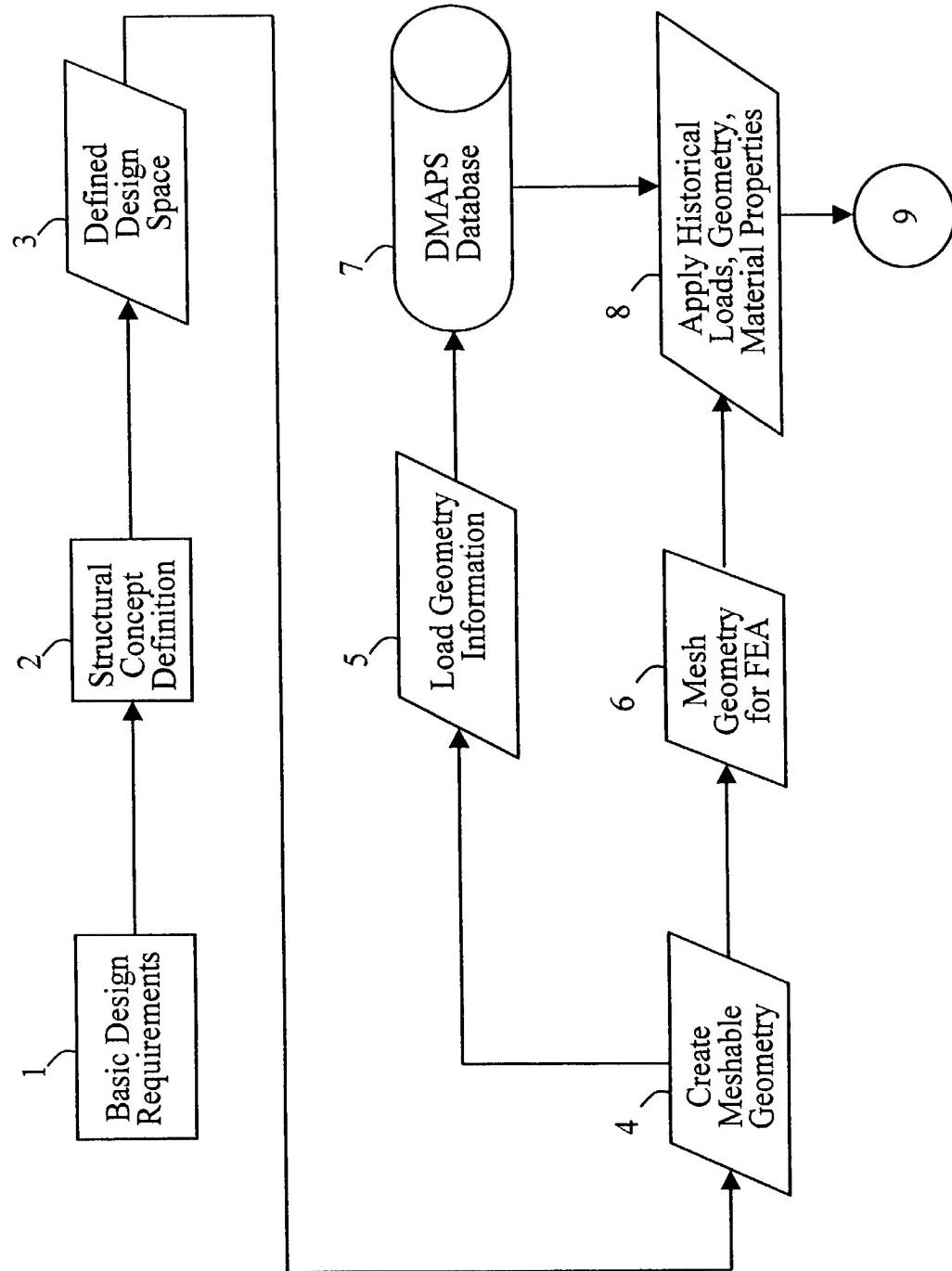
**FIG. 5**



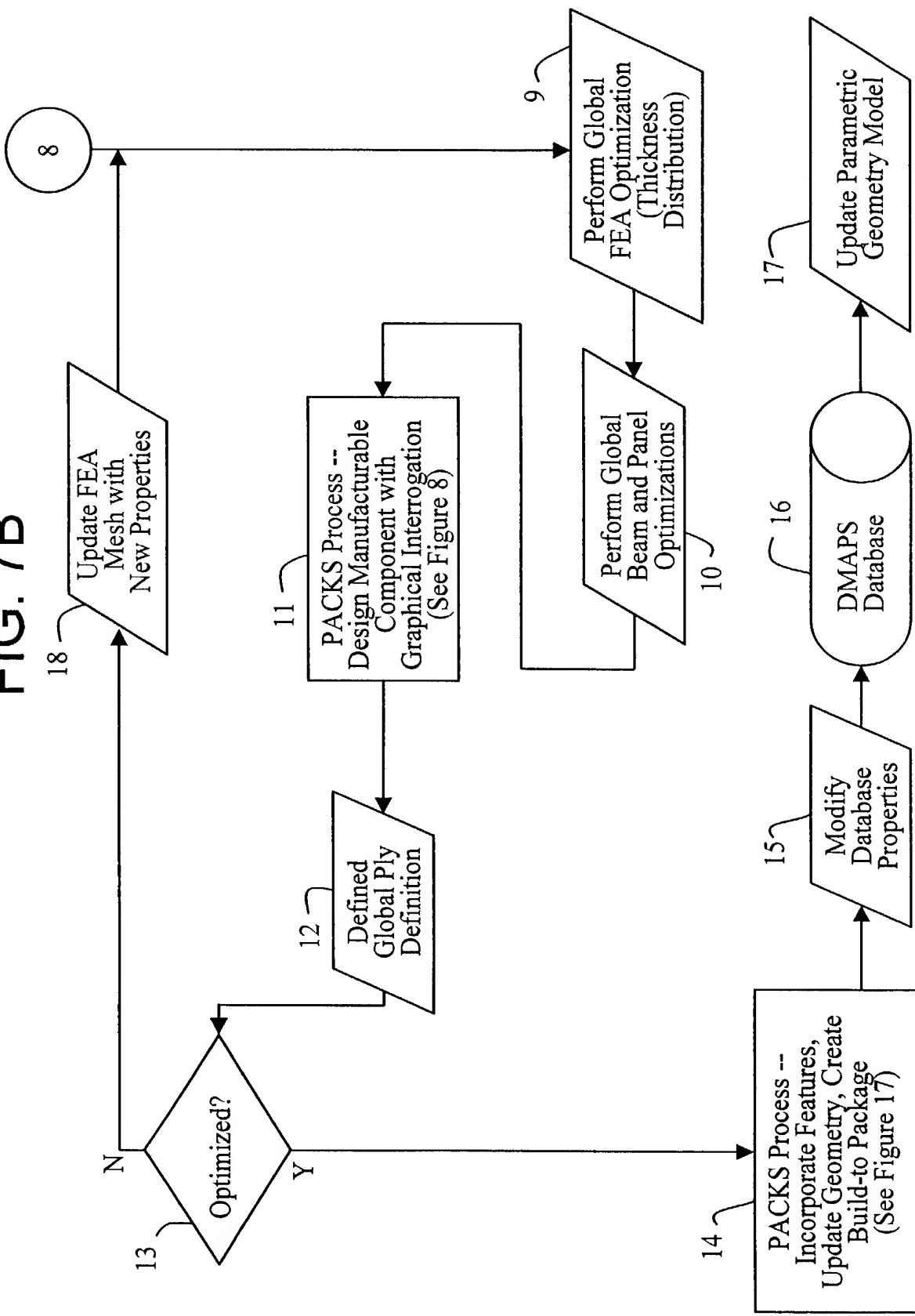
**FIG. 6**



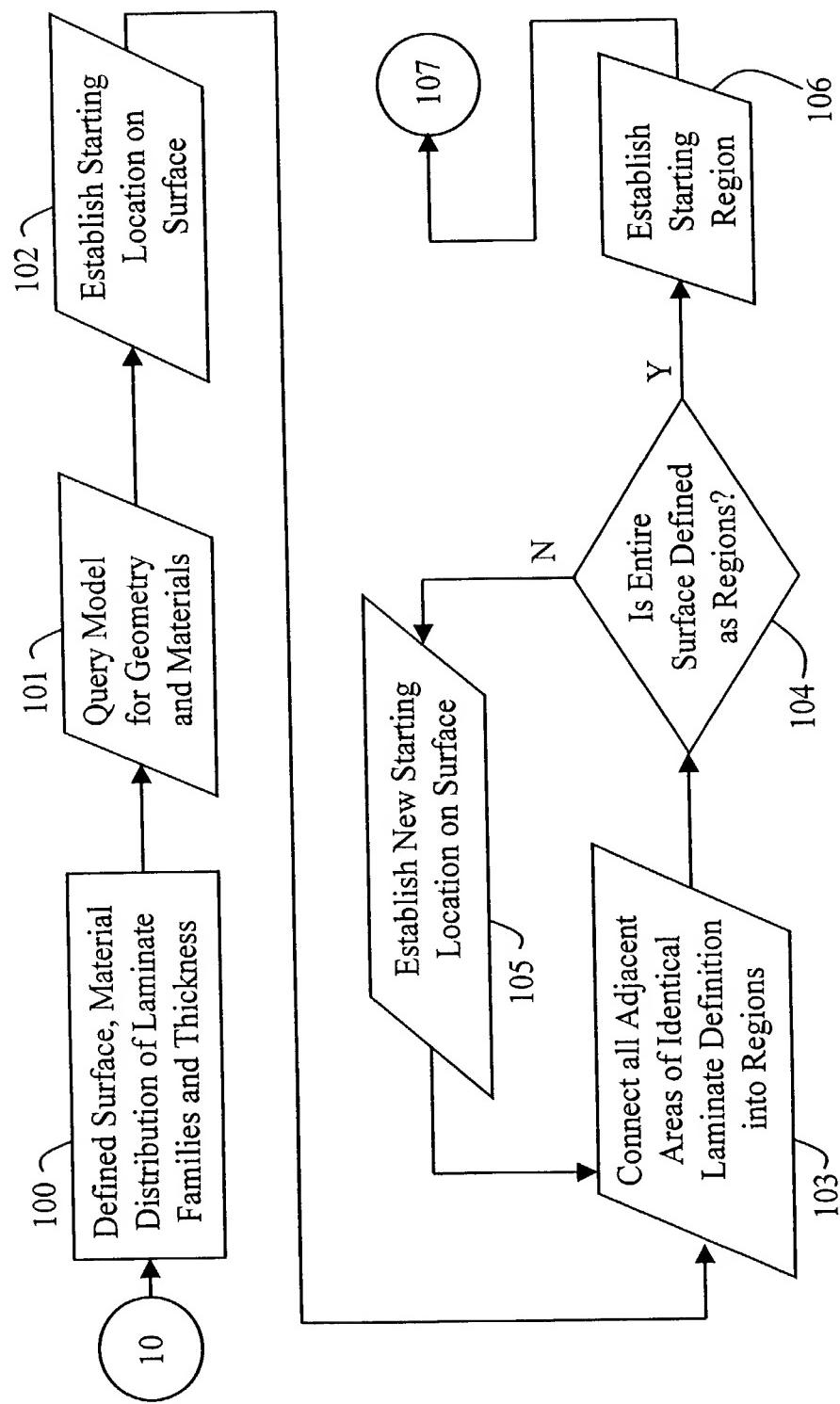
**FIG. 7A**



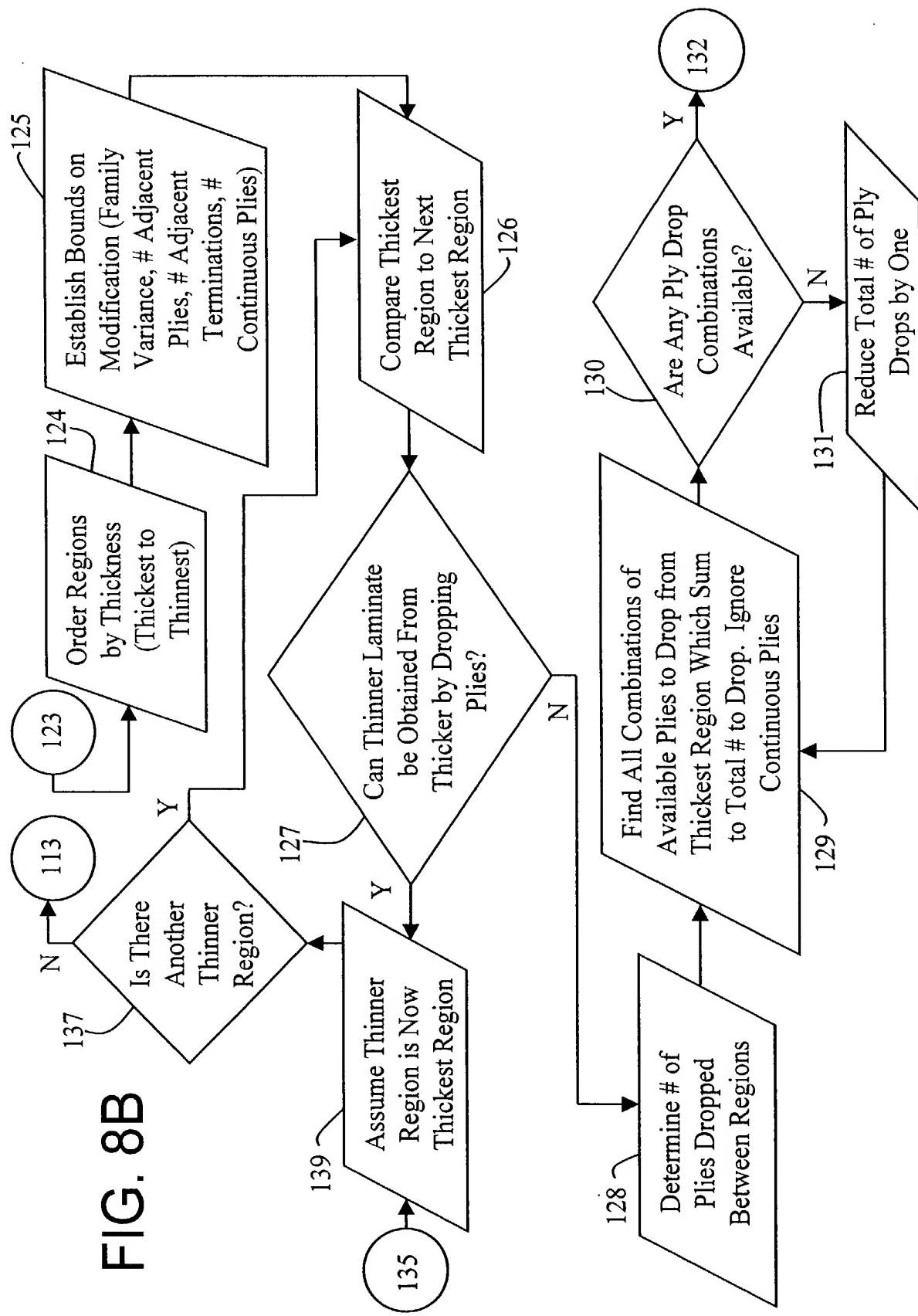
**FIG. 7B**



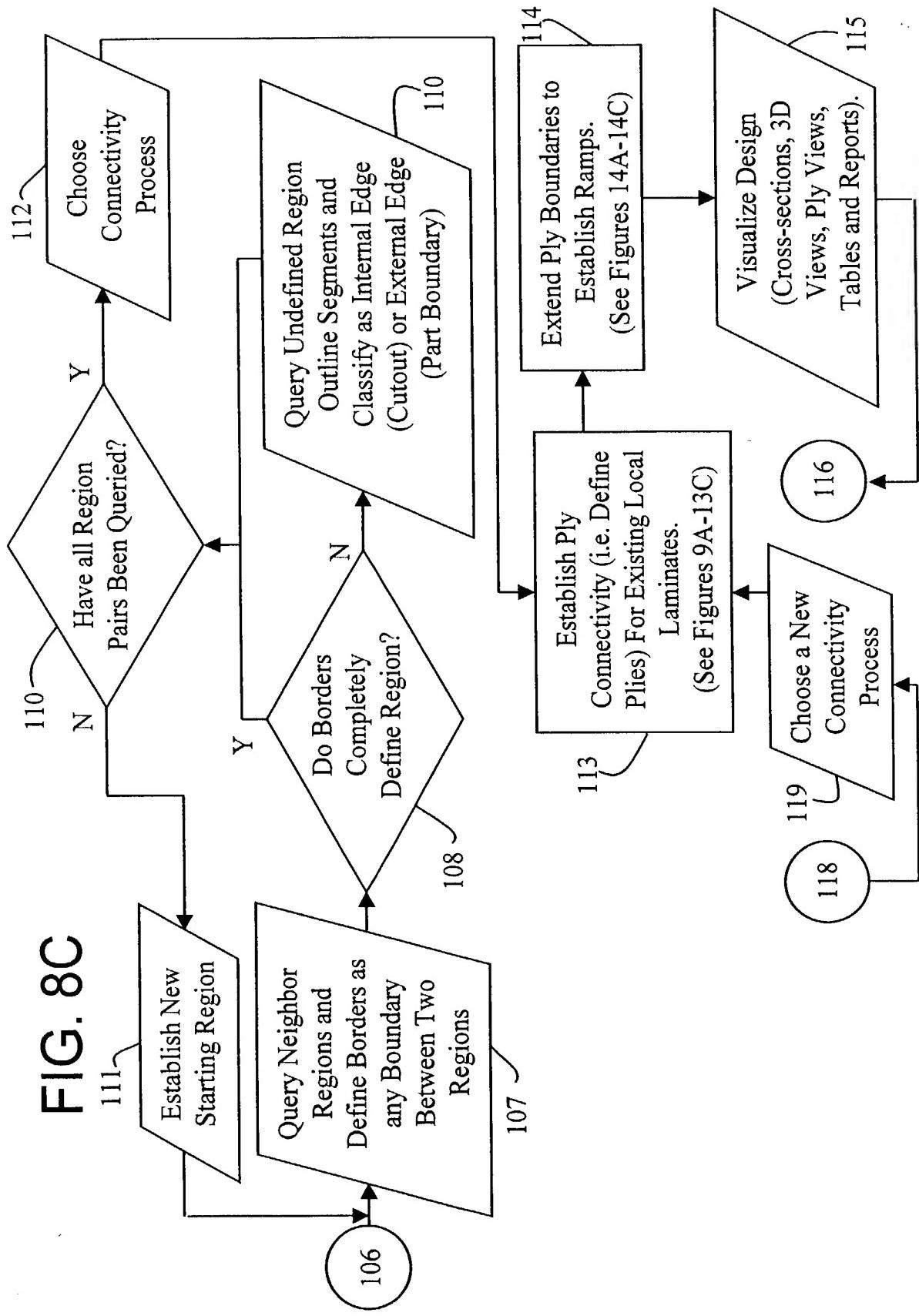
**FIG. 8A**



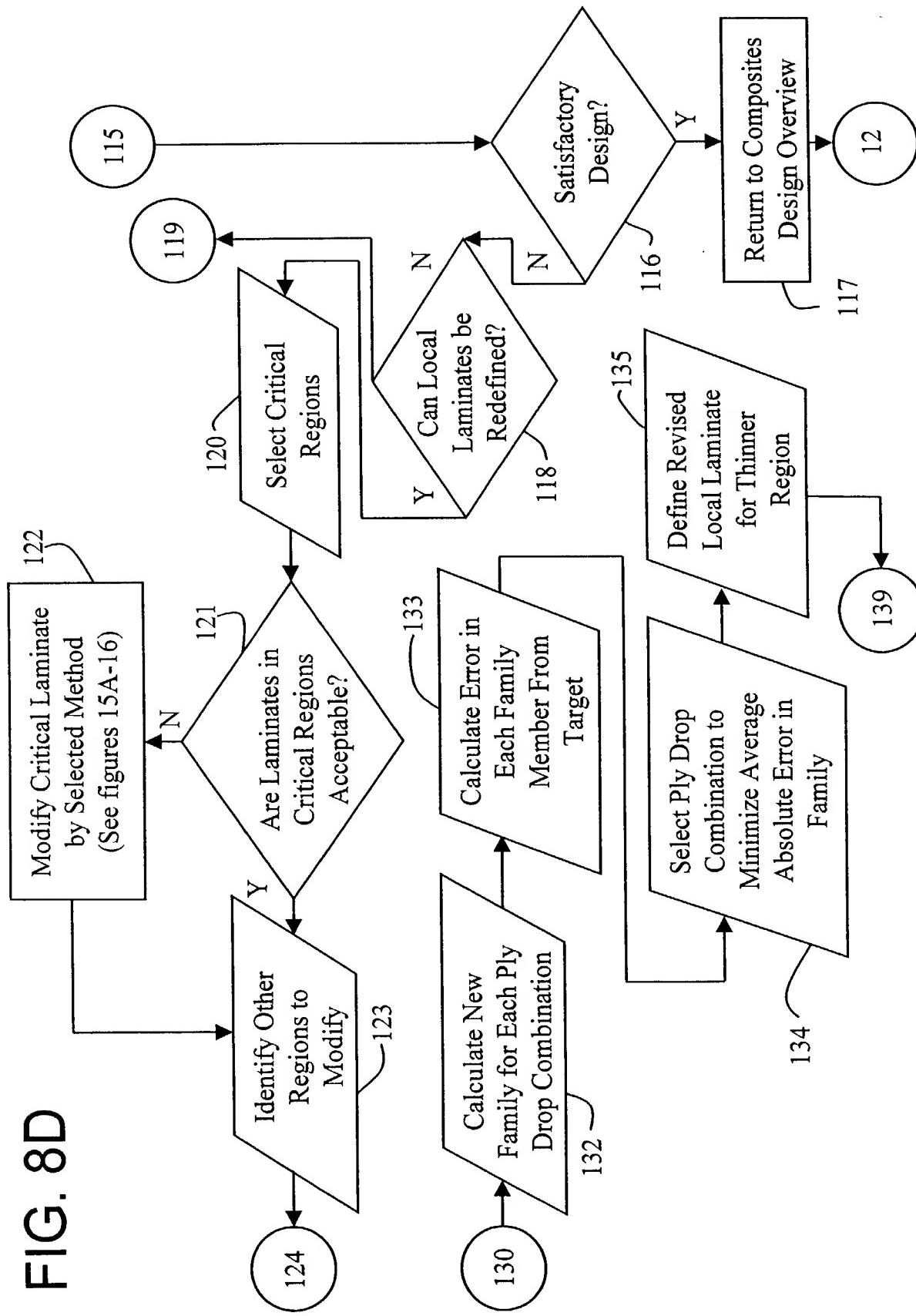
**FIG. 8B**



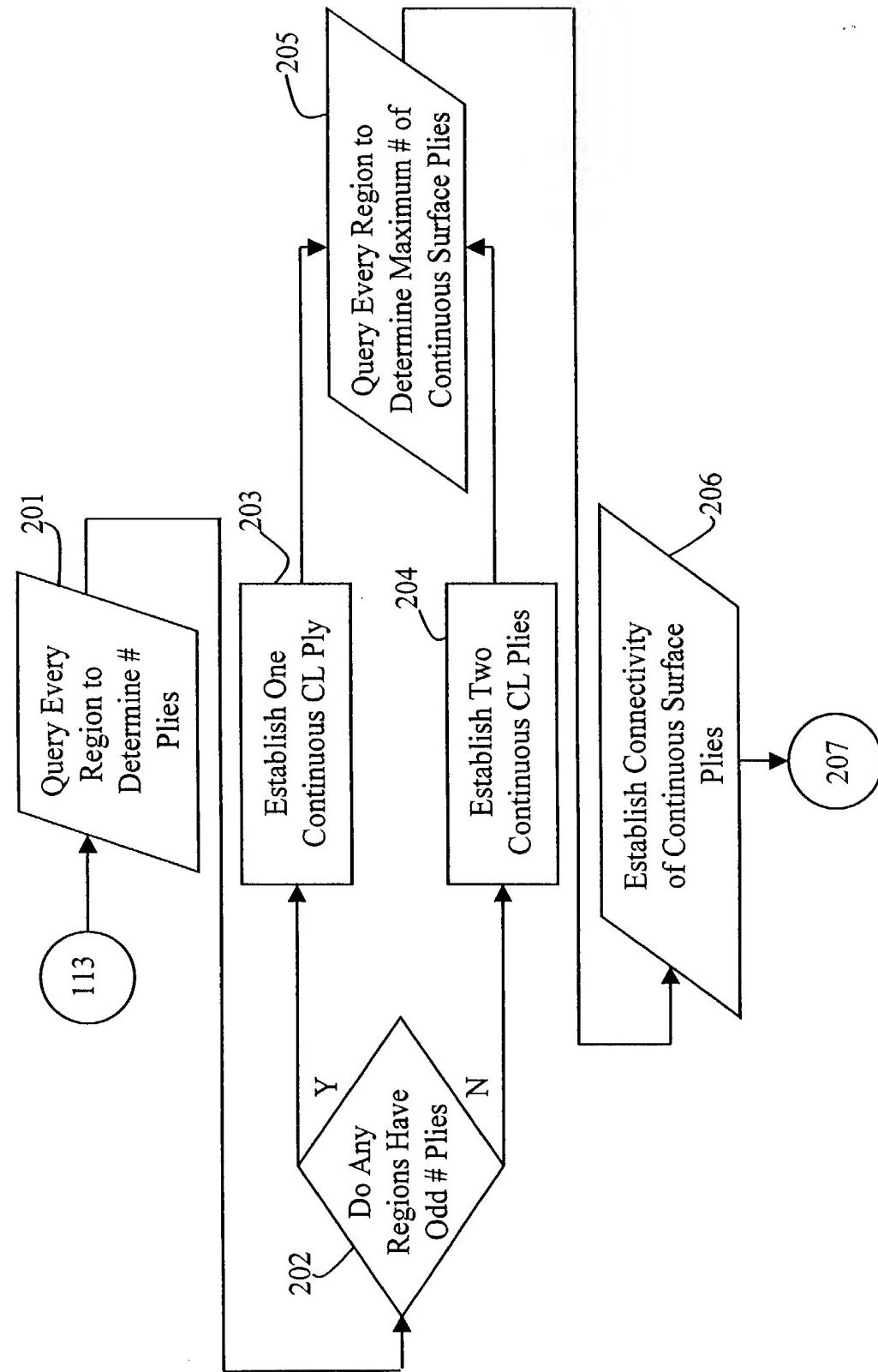
**FIG. 8C**



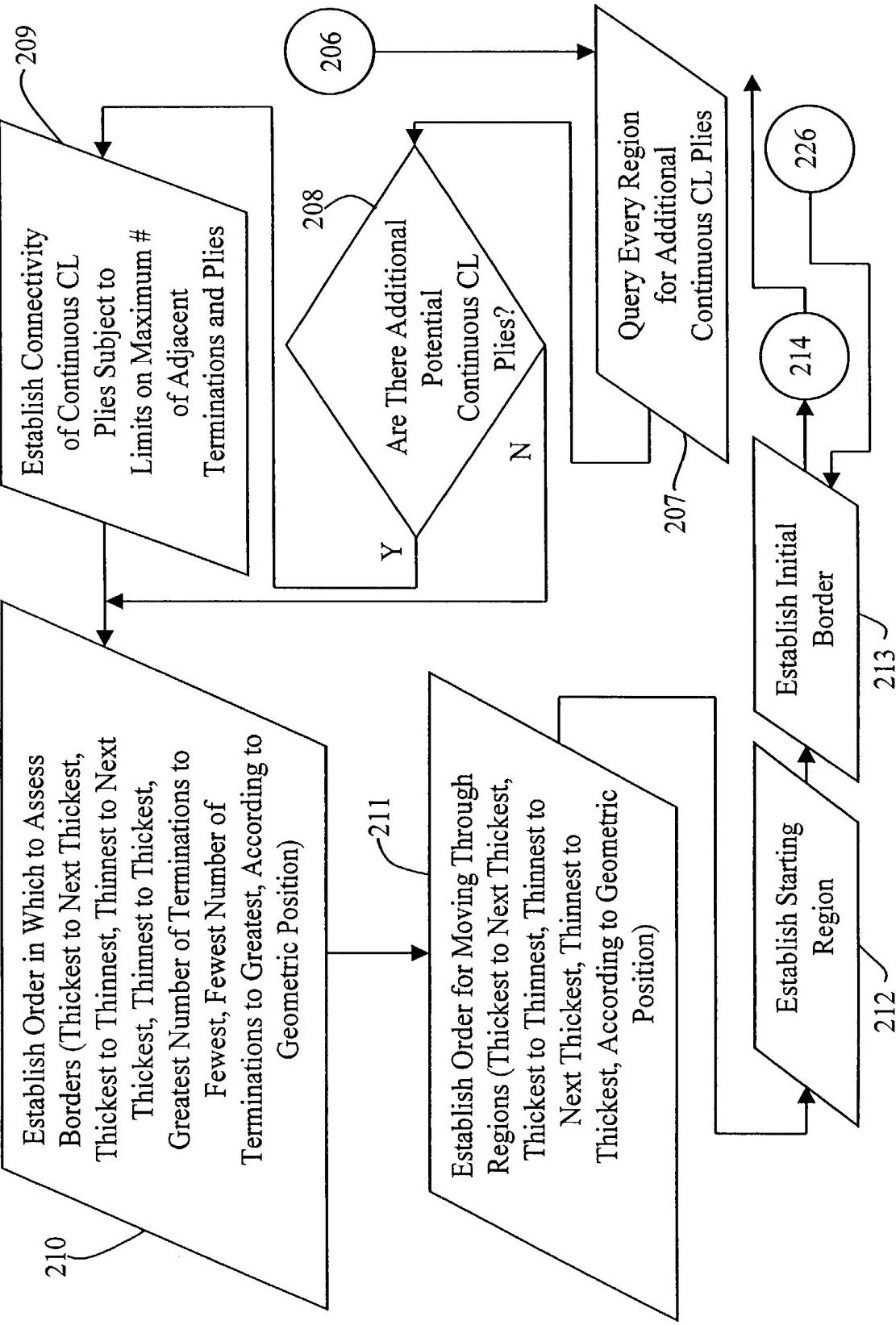
**FIG. 8D**



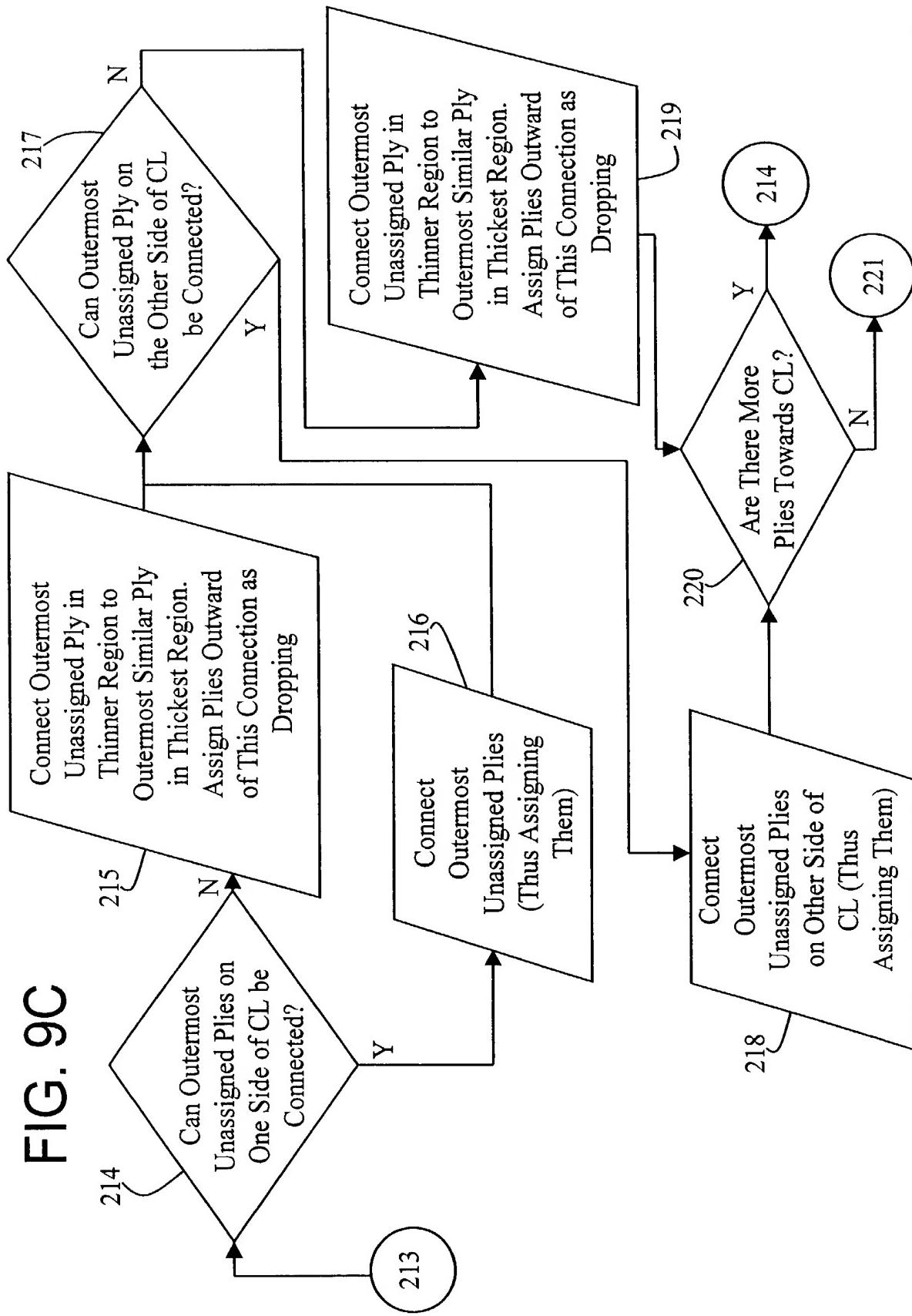
**FIG. 9A**



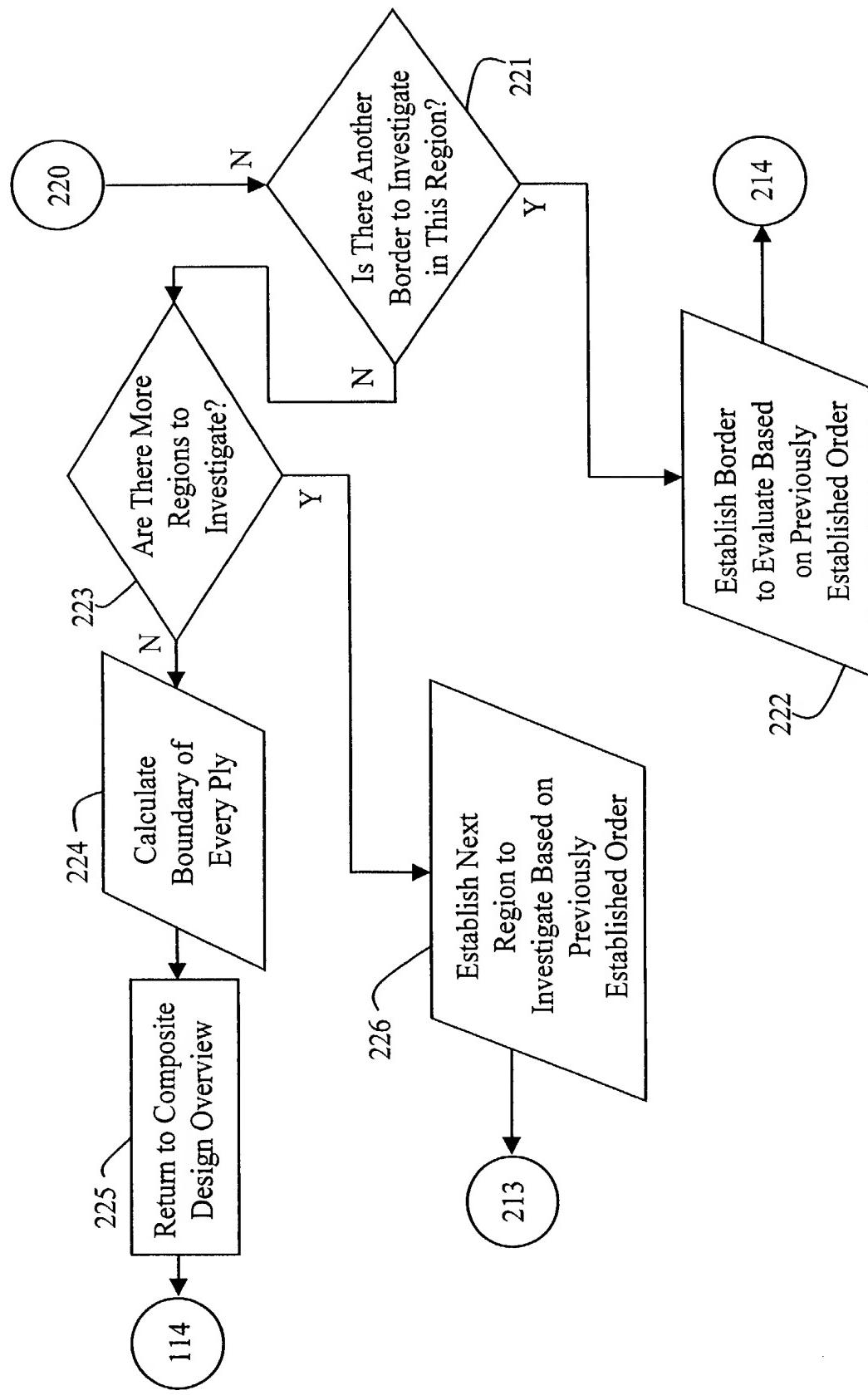
**FIG. 9B**



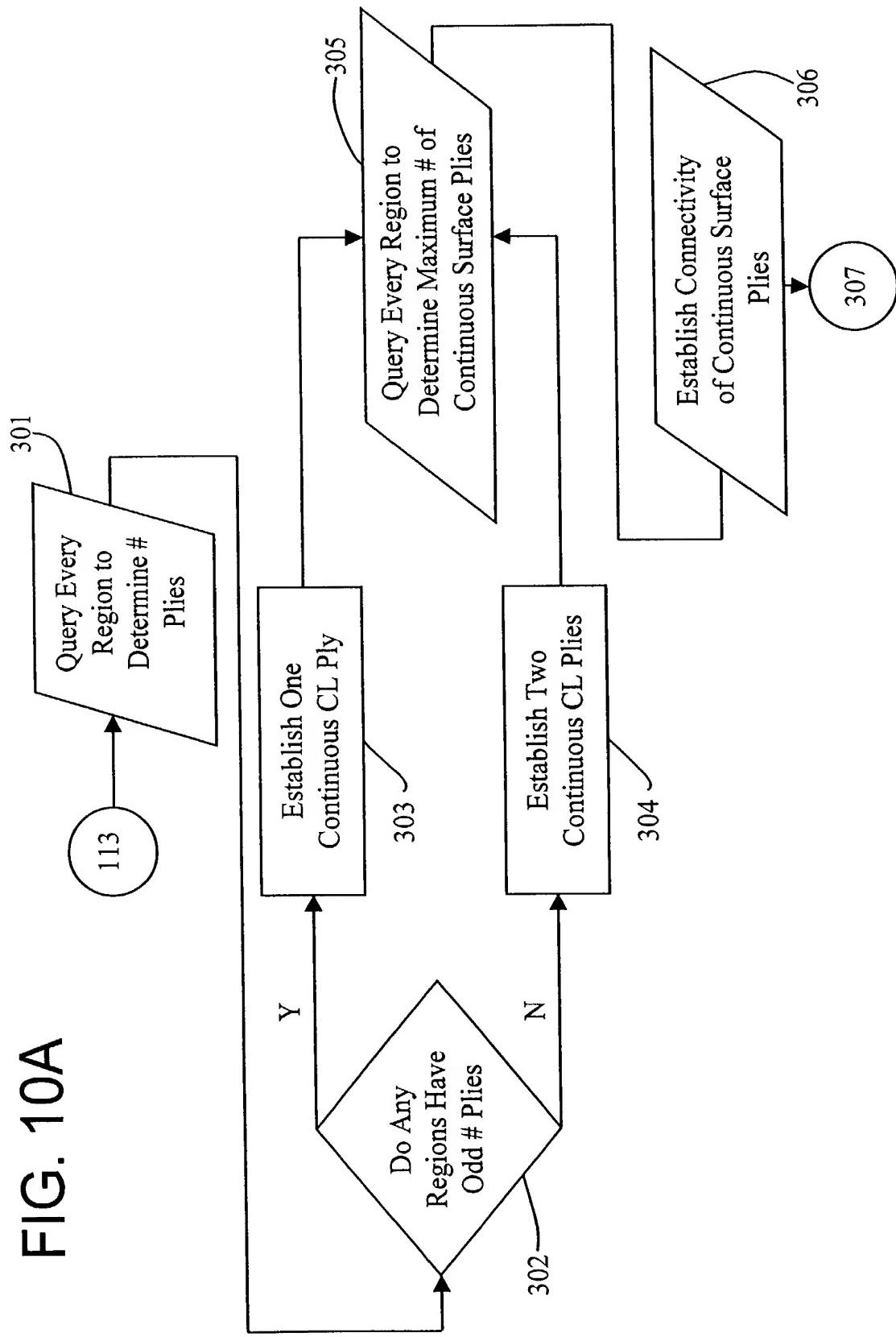
**FIG. 9C**



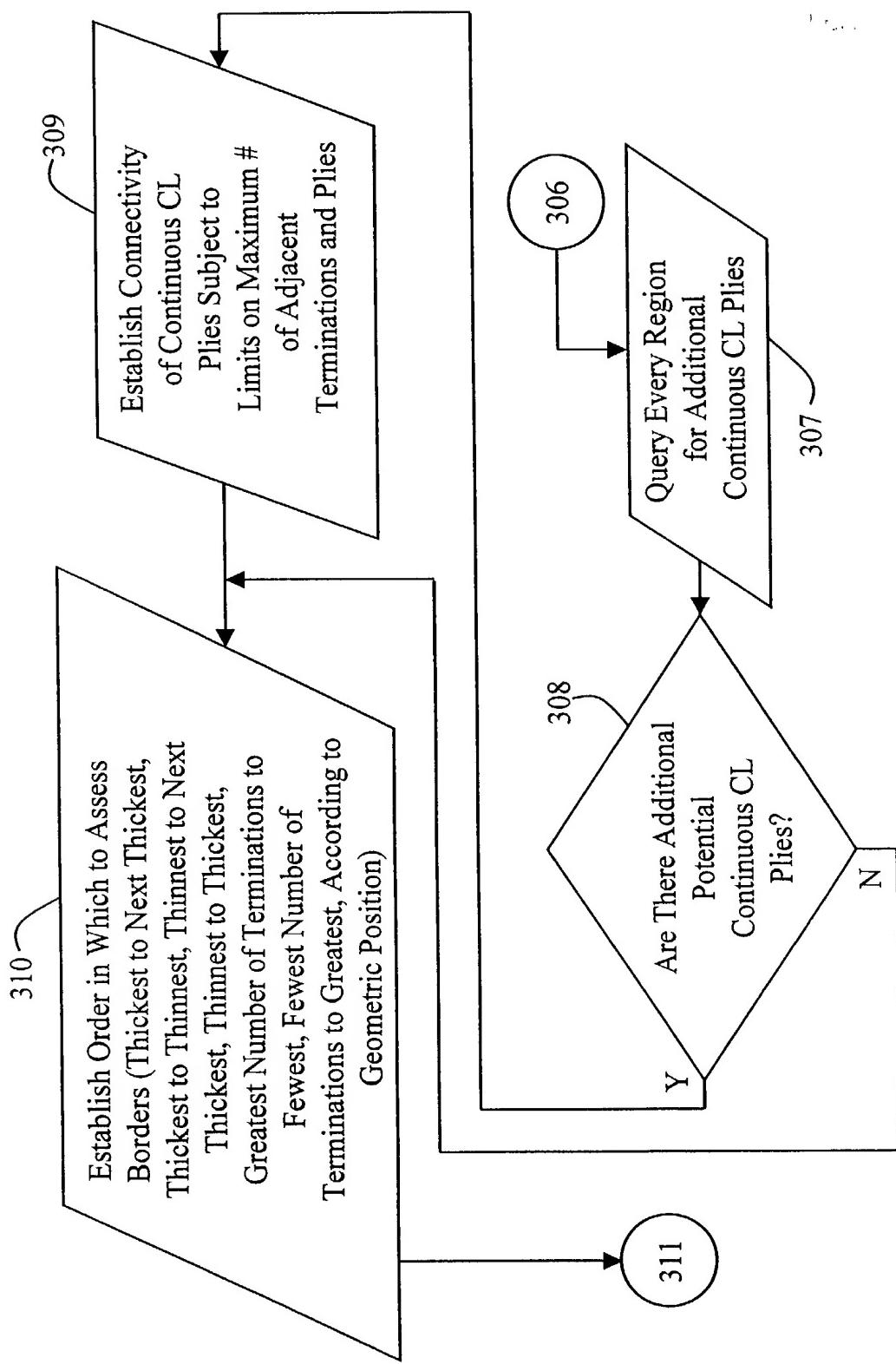
**FIG. 9D**



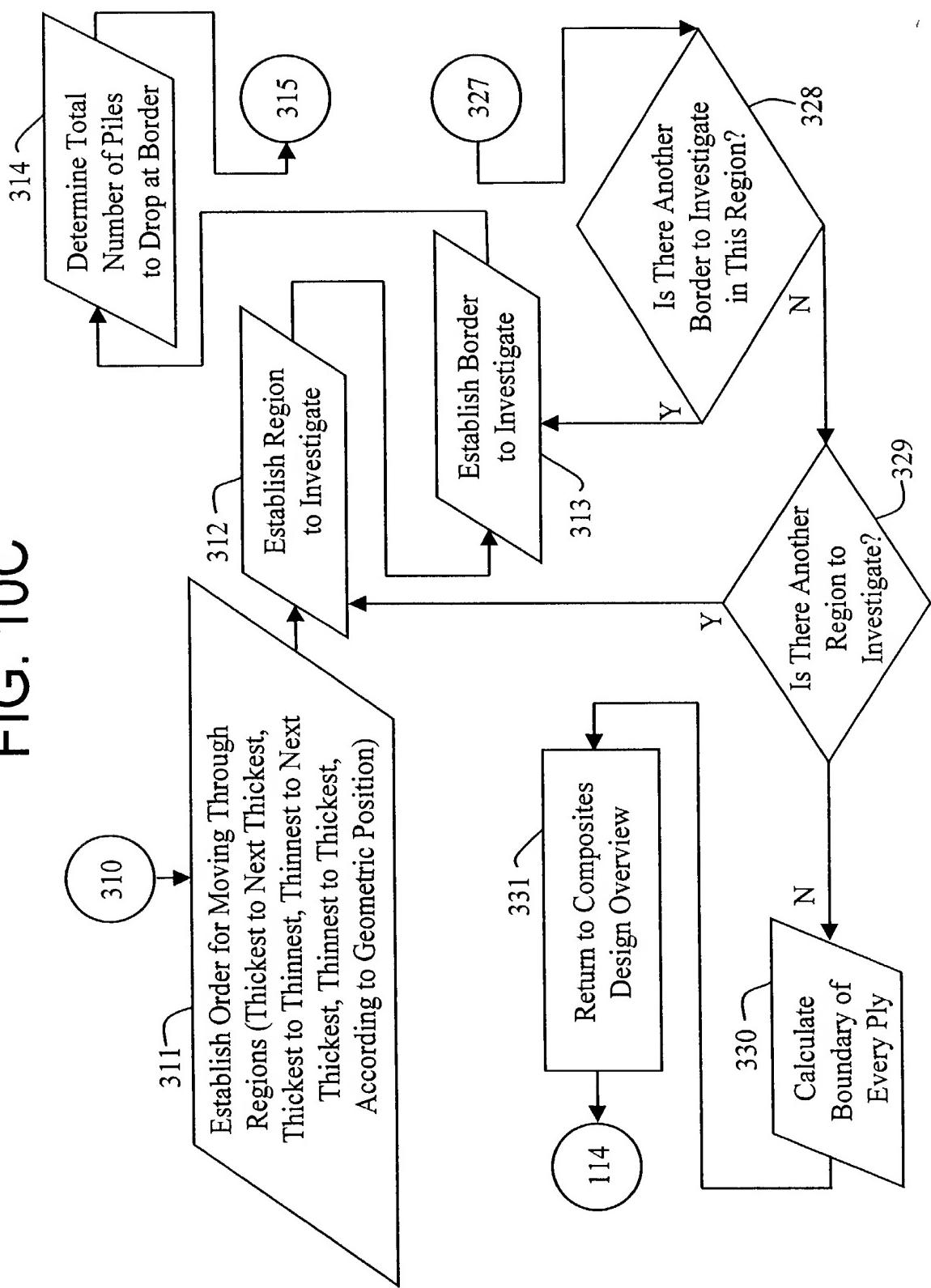
**FIG. 10A**



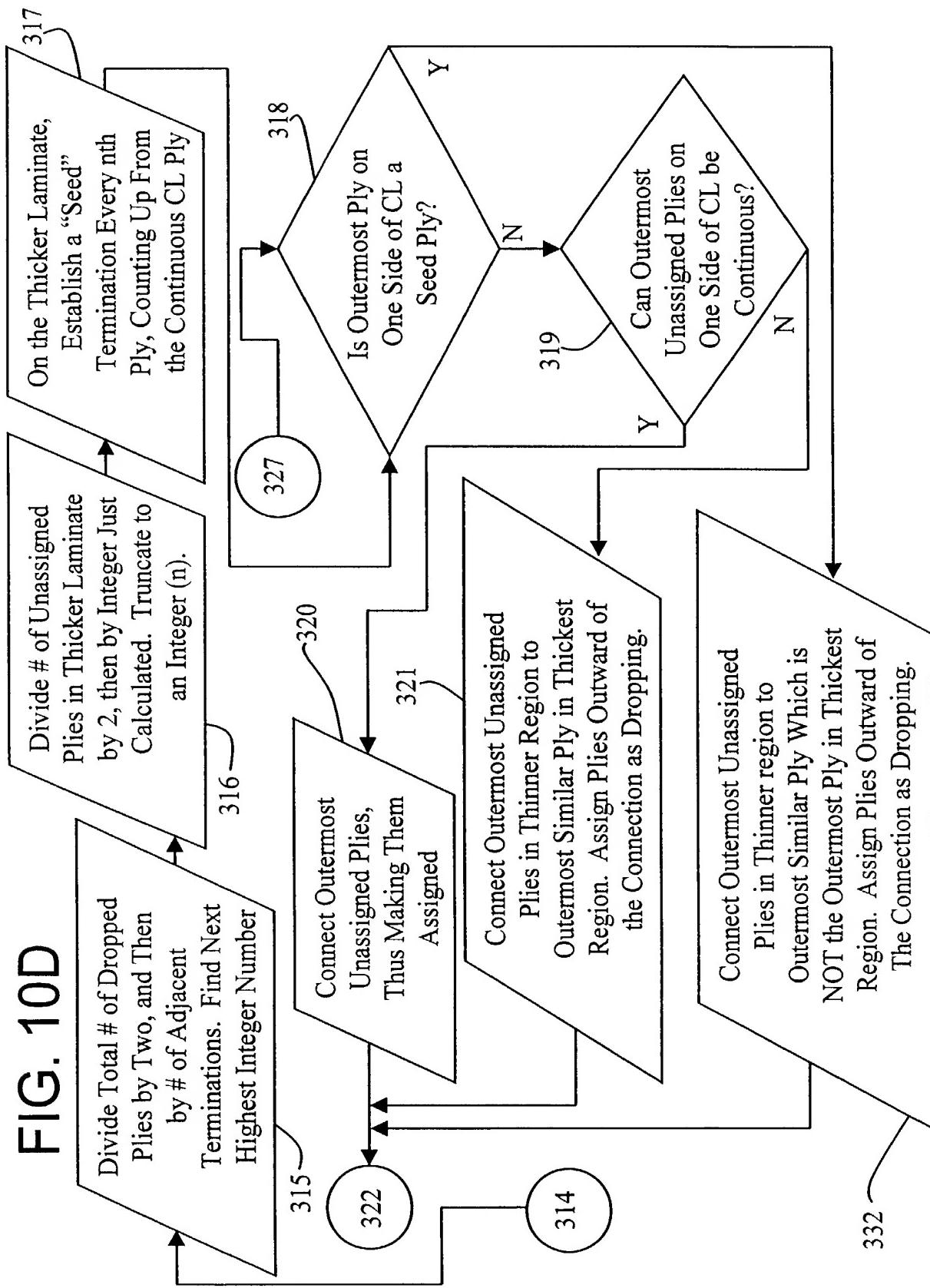
**FIG. 10B**



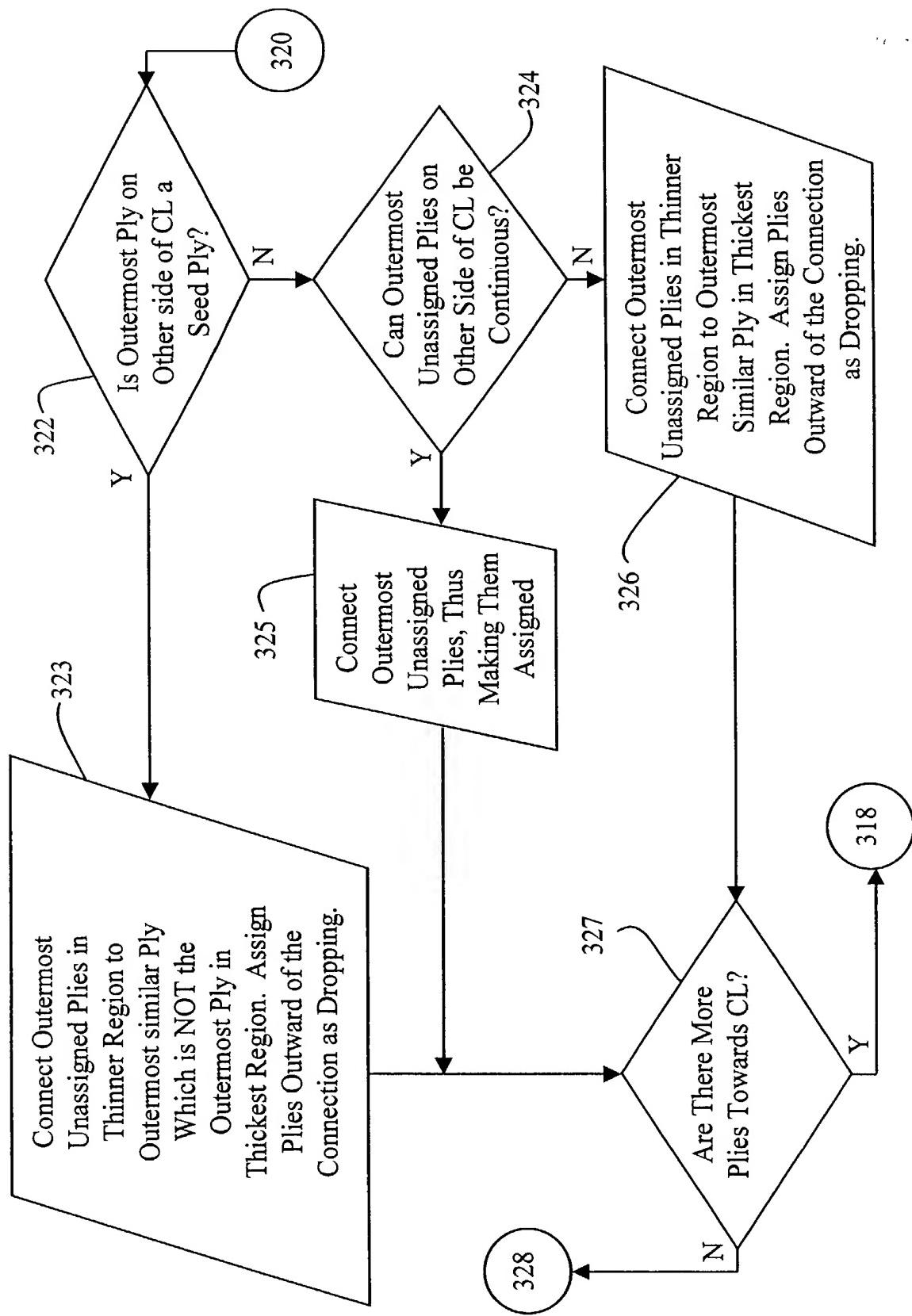
**FIG. 10C**



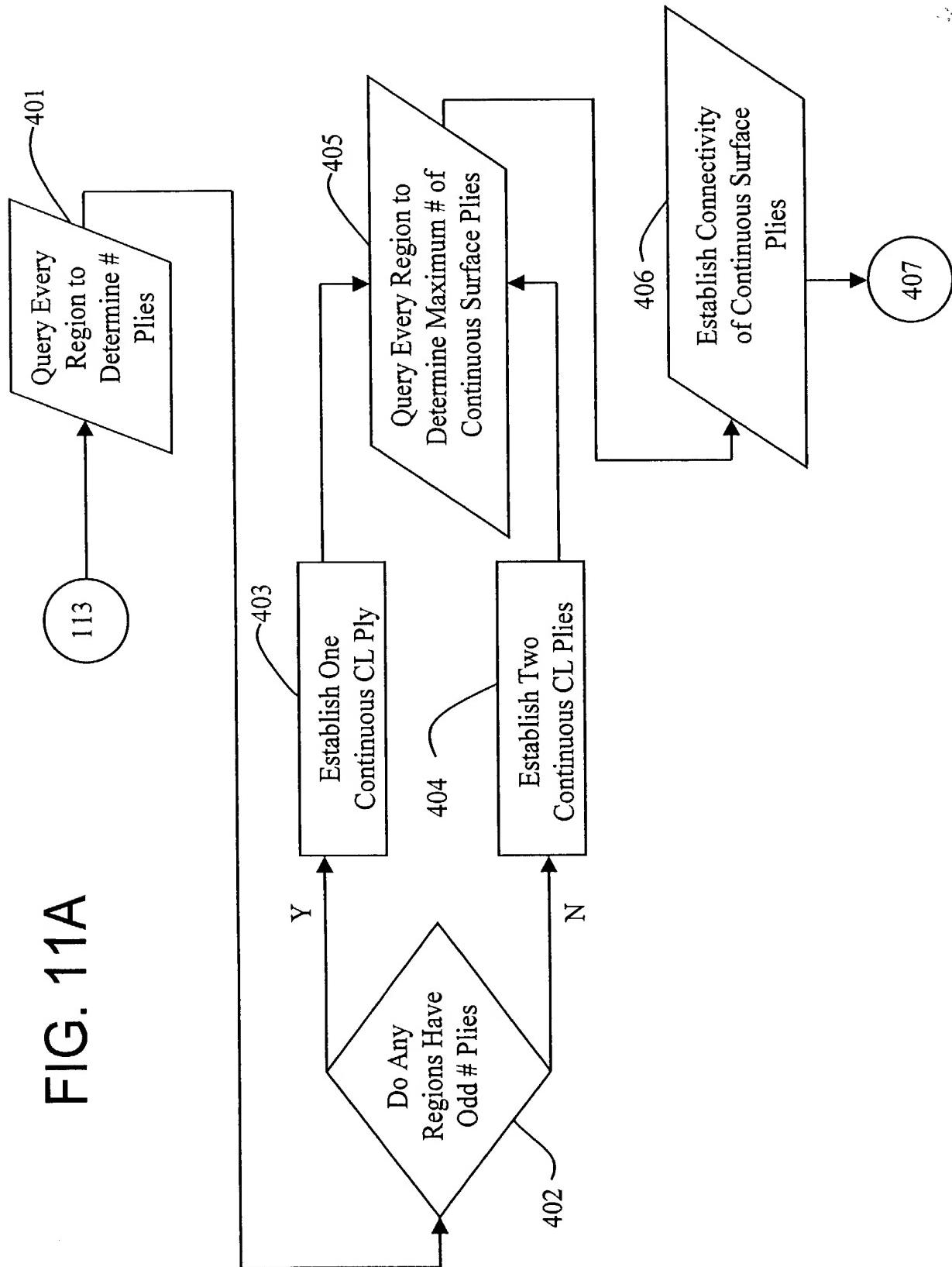
**FIG. 10D**



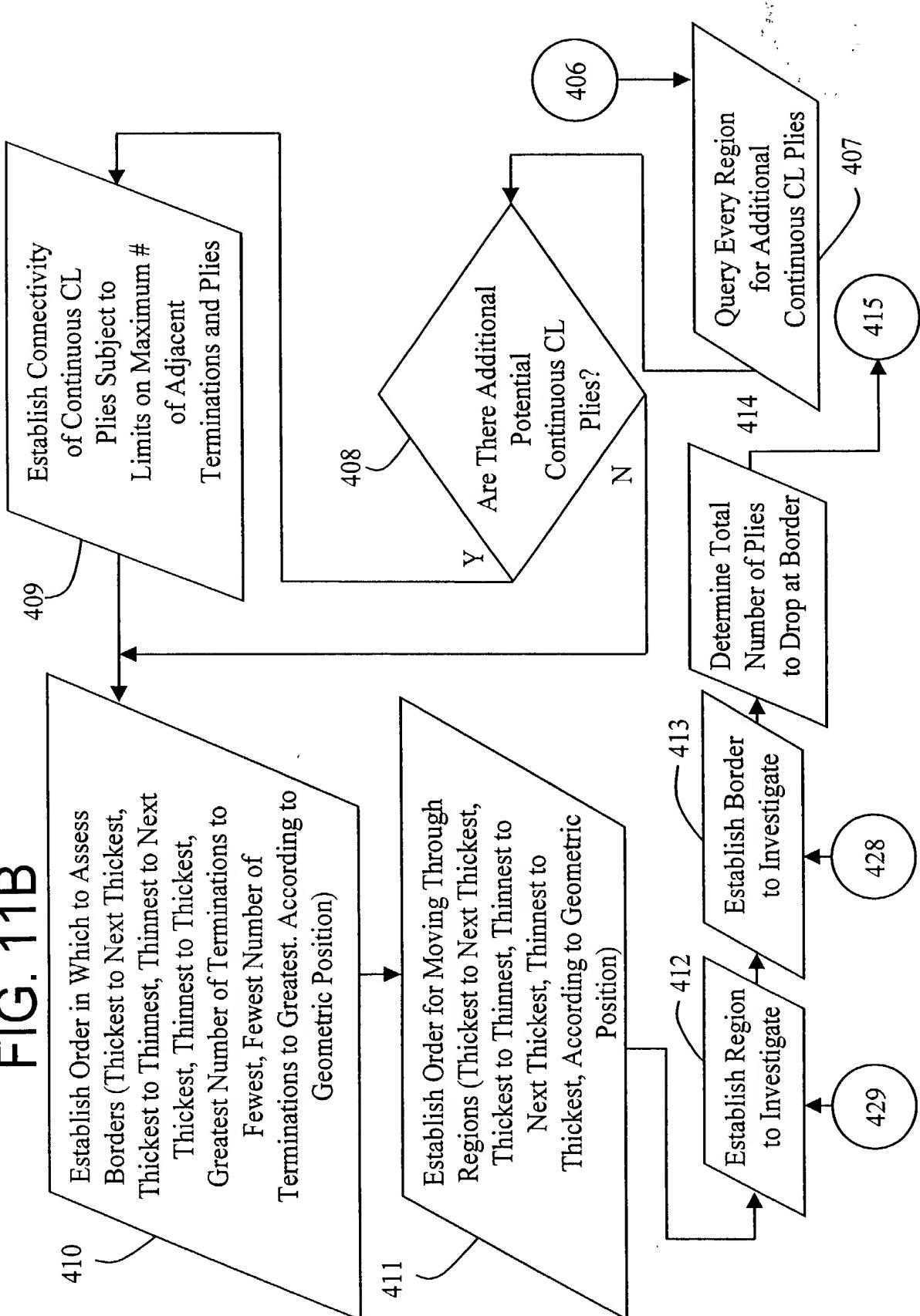
**FIG. 10E**



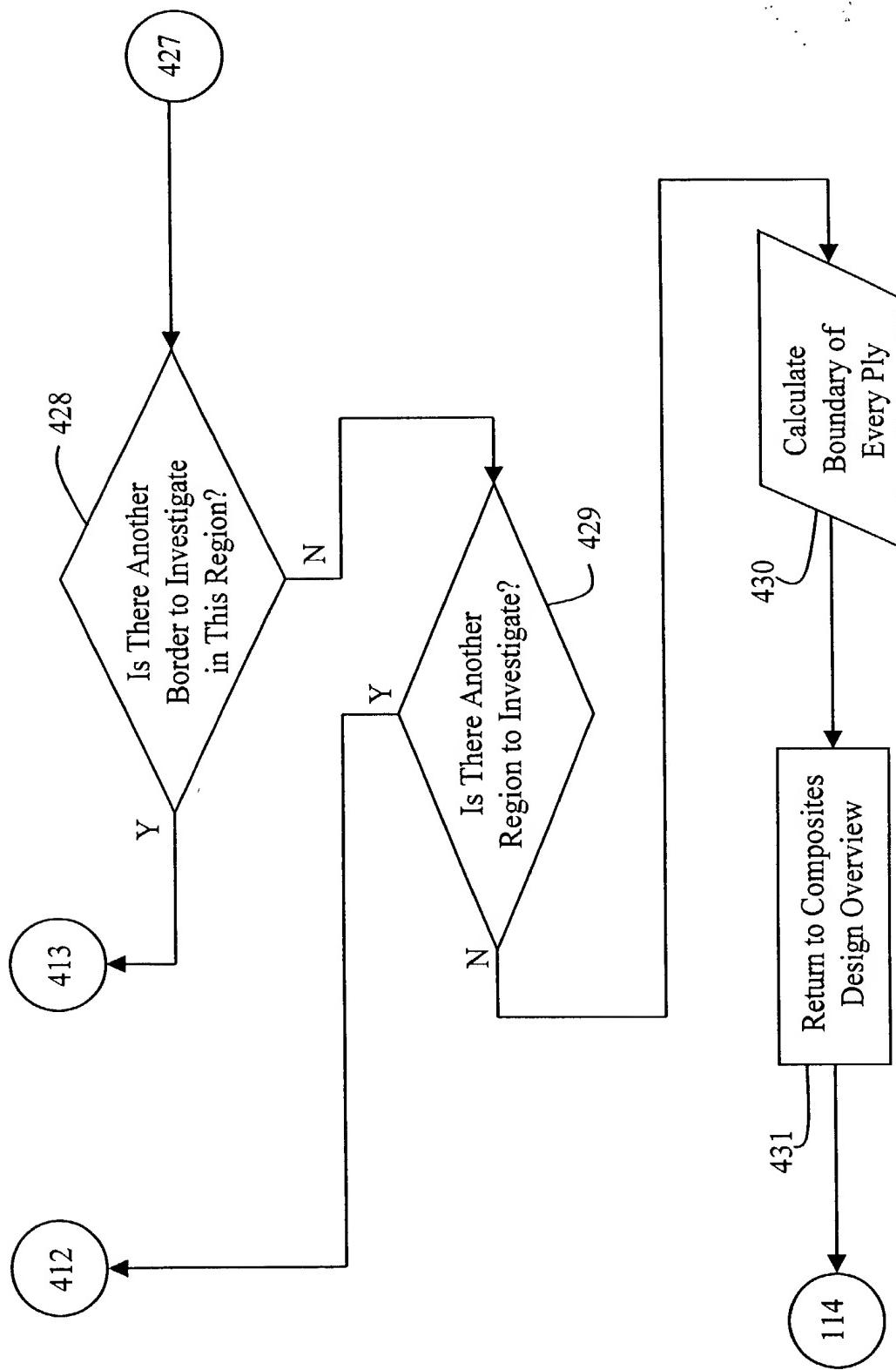
**FIG. 11A**



**FIG. 11B**



**FIG. 11C**



**FIG. 11D**

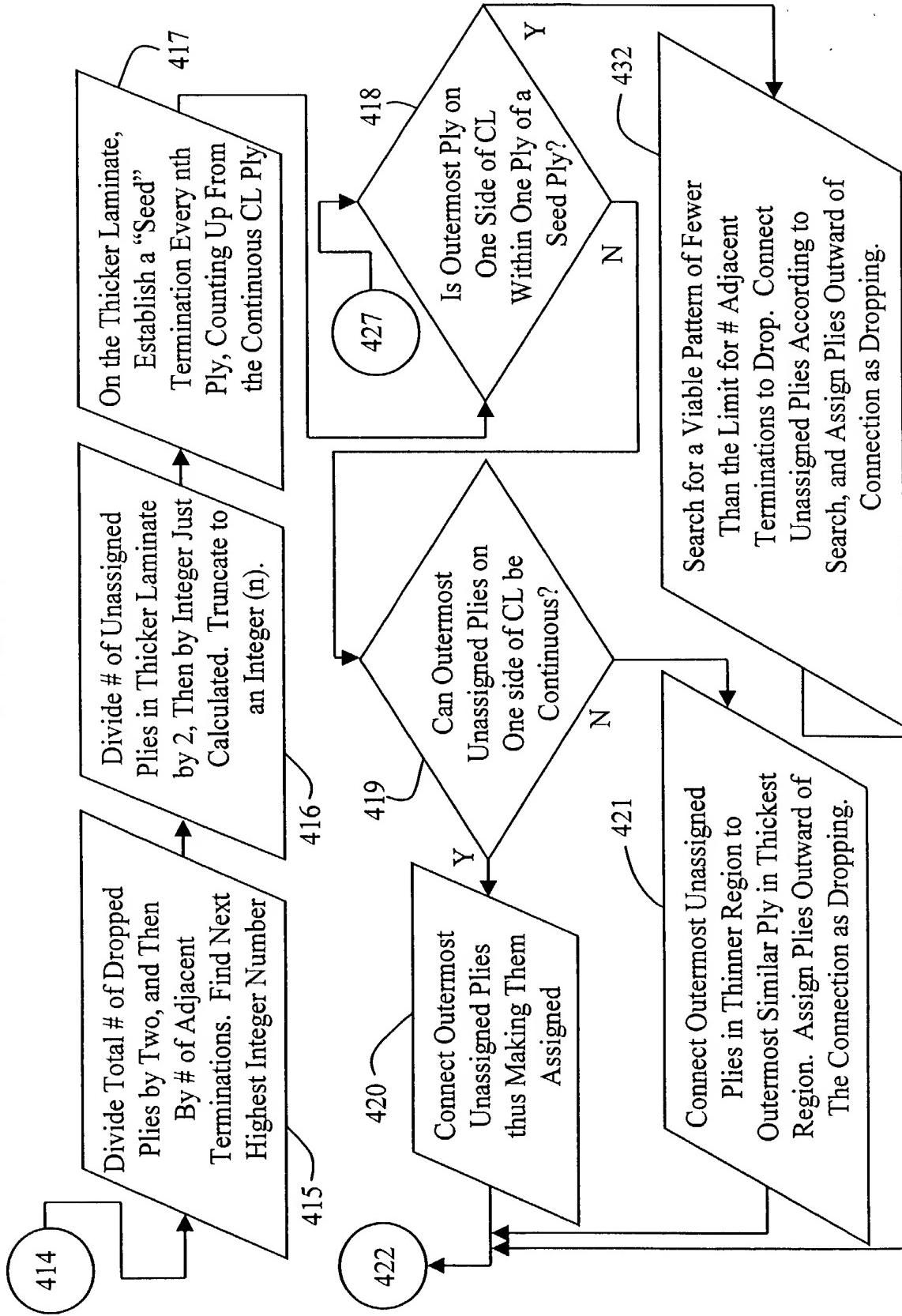
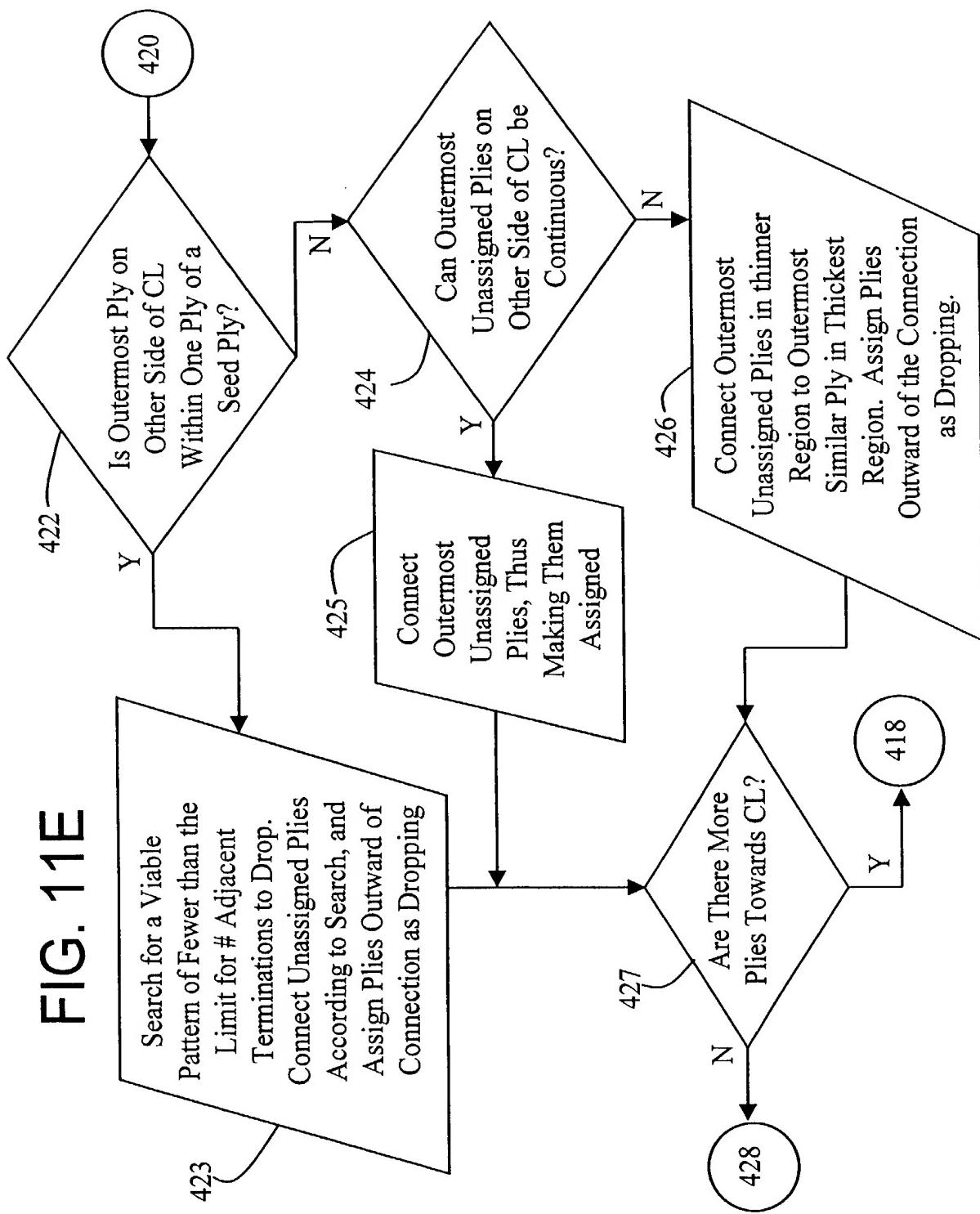
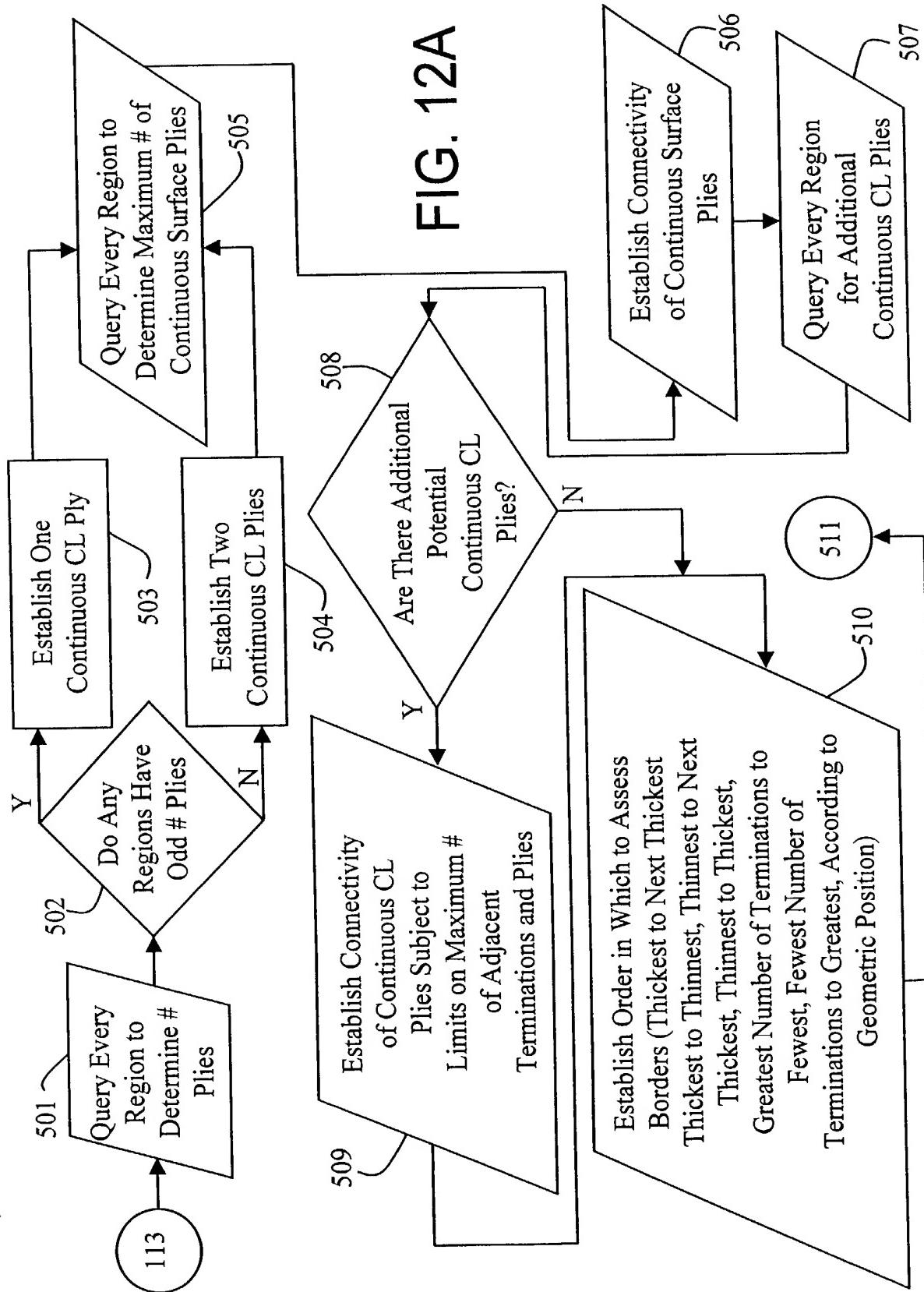
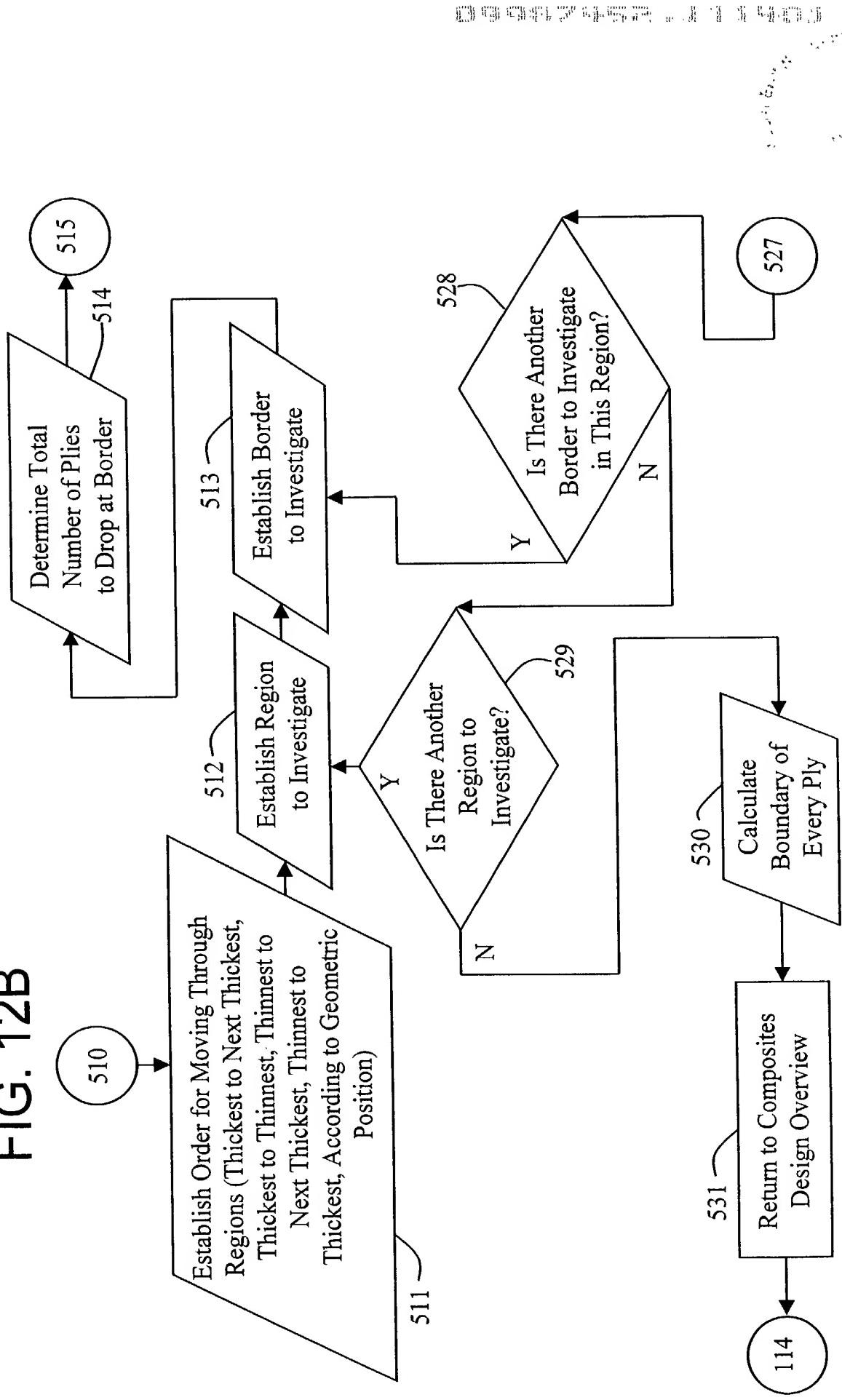


FIG. 11E

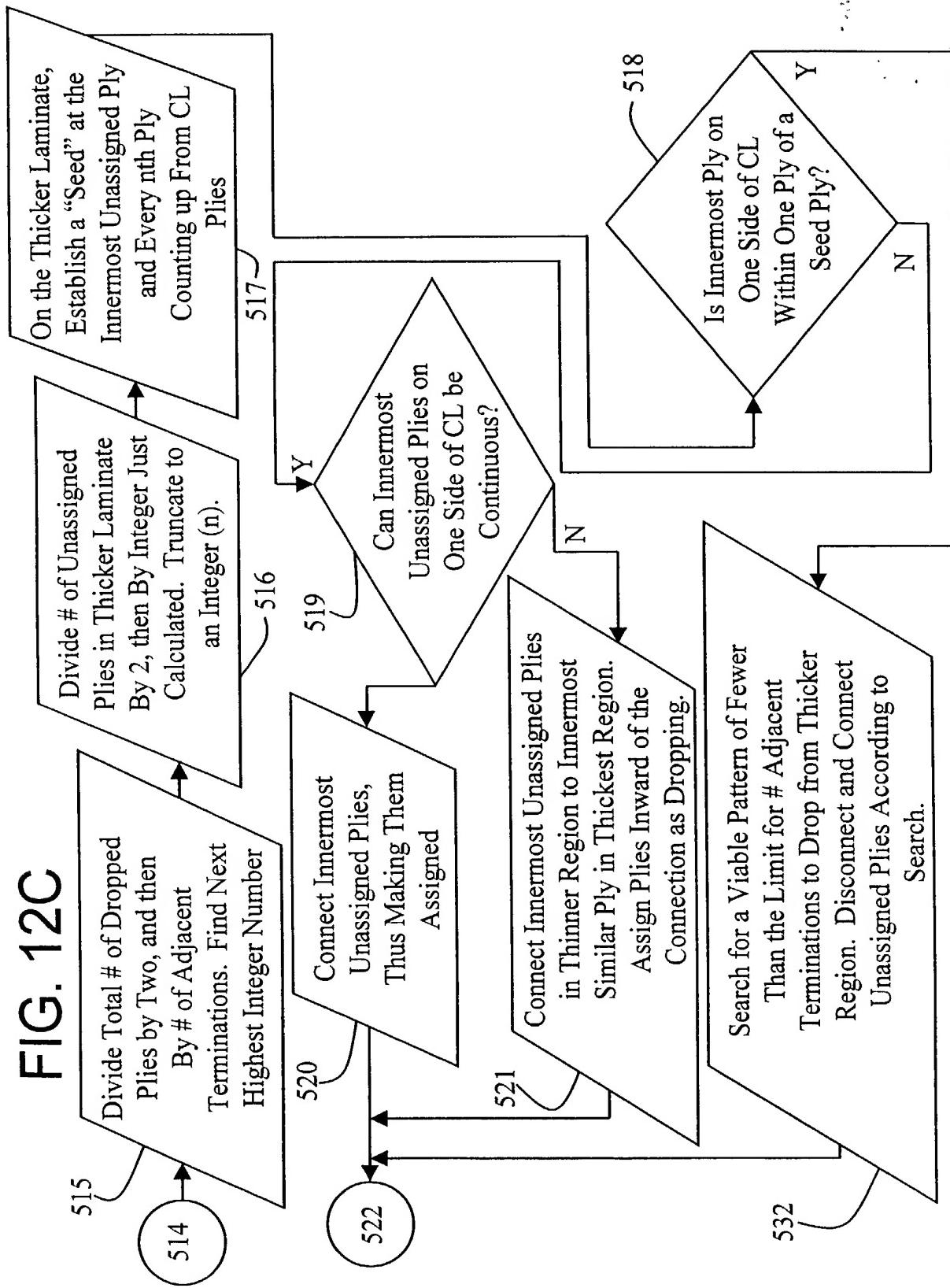




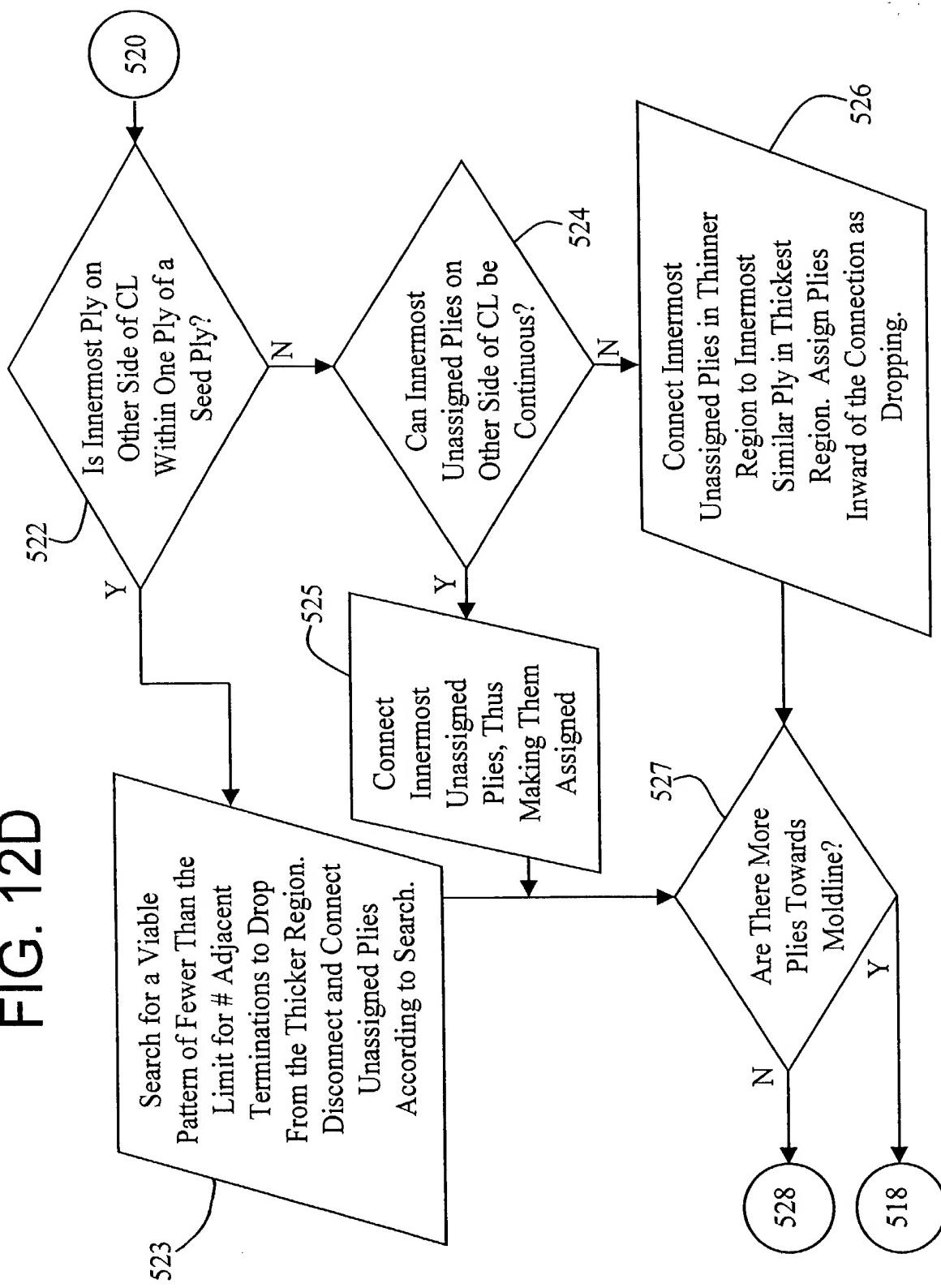
**FIG. 12B**



**FIG. 12C**



**FIG. 12D**



**FIG. 13A**

601  
Query Every  
Region to  
Determine #  
Plies

Establish One  
Continuous CL Ply

Establish Two  
Continuous CL Plies

Establish Connectivity  
of Continuous surface  
Plies

607

605  
Query Every Region to  
Determine Maximum # of  
Continuous Surface Plies

603

Establish One  
Continuous CL Ply

Establish Two  
Continuous CL Plies

606

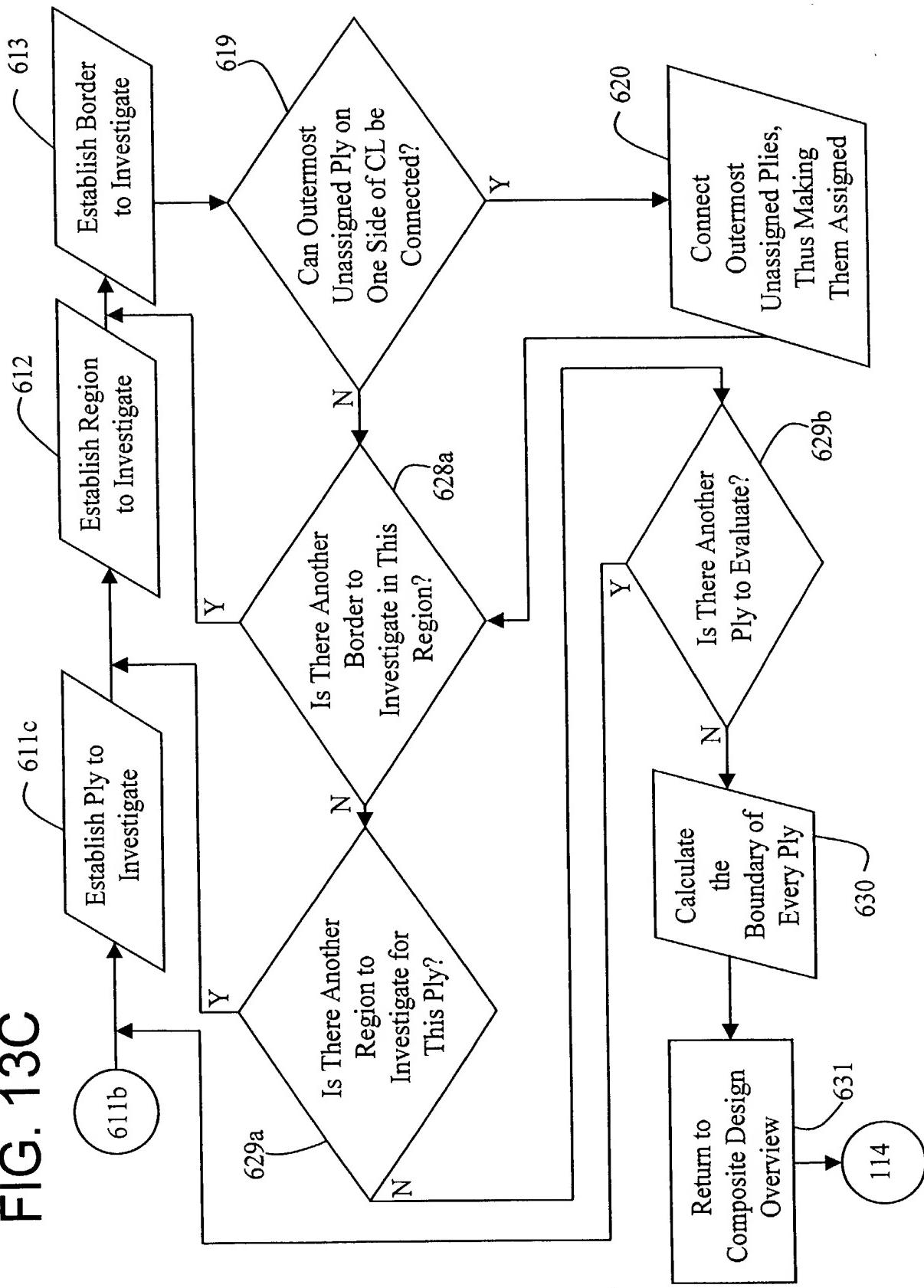
Do Any  
Regions Have  
Odd # Plies

602

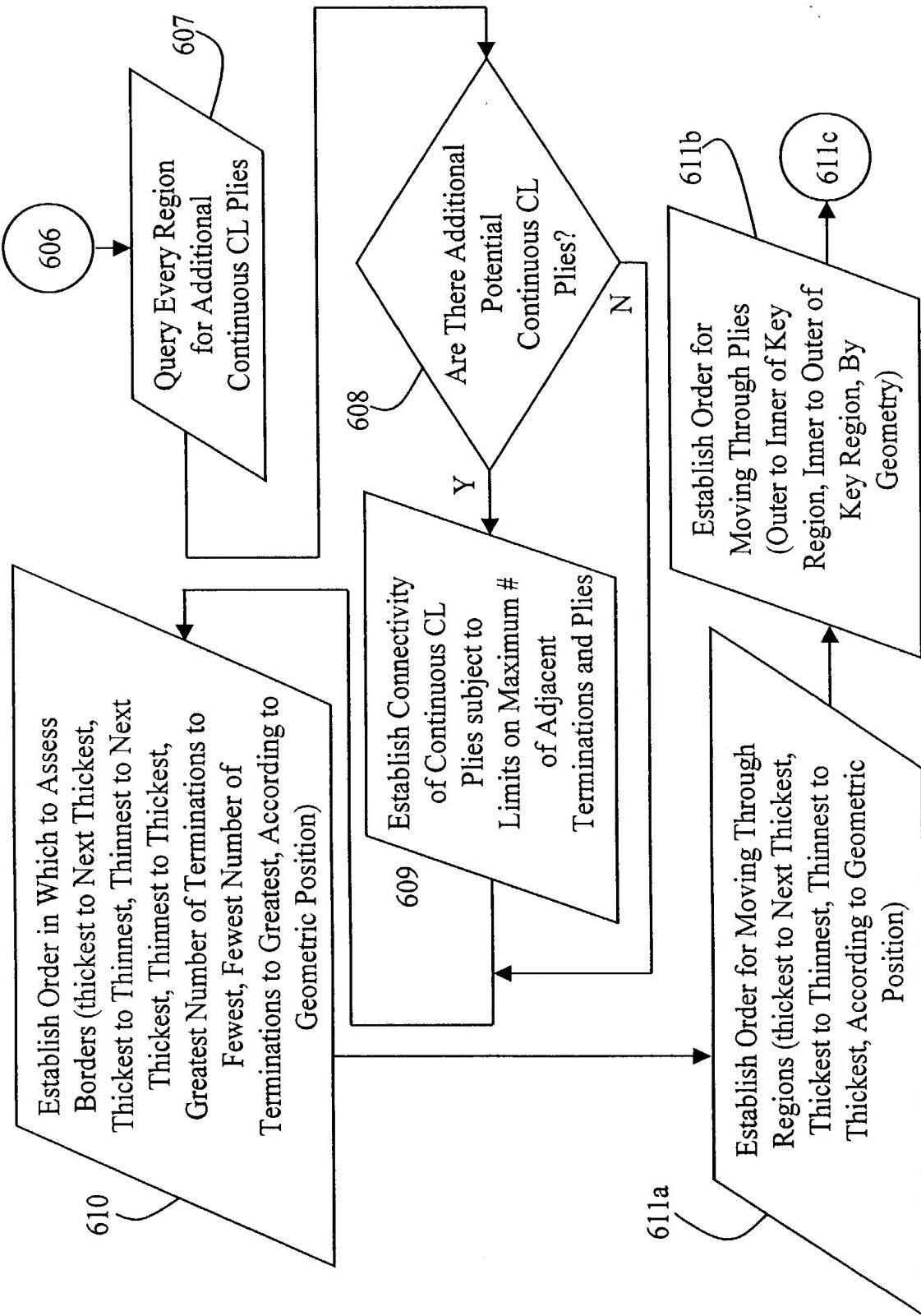
N

601  
Query Every Region to Determine # Plies

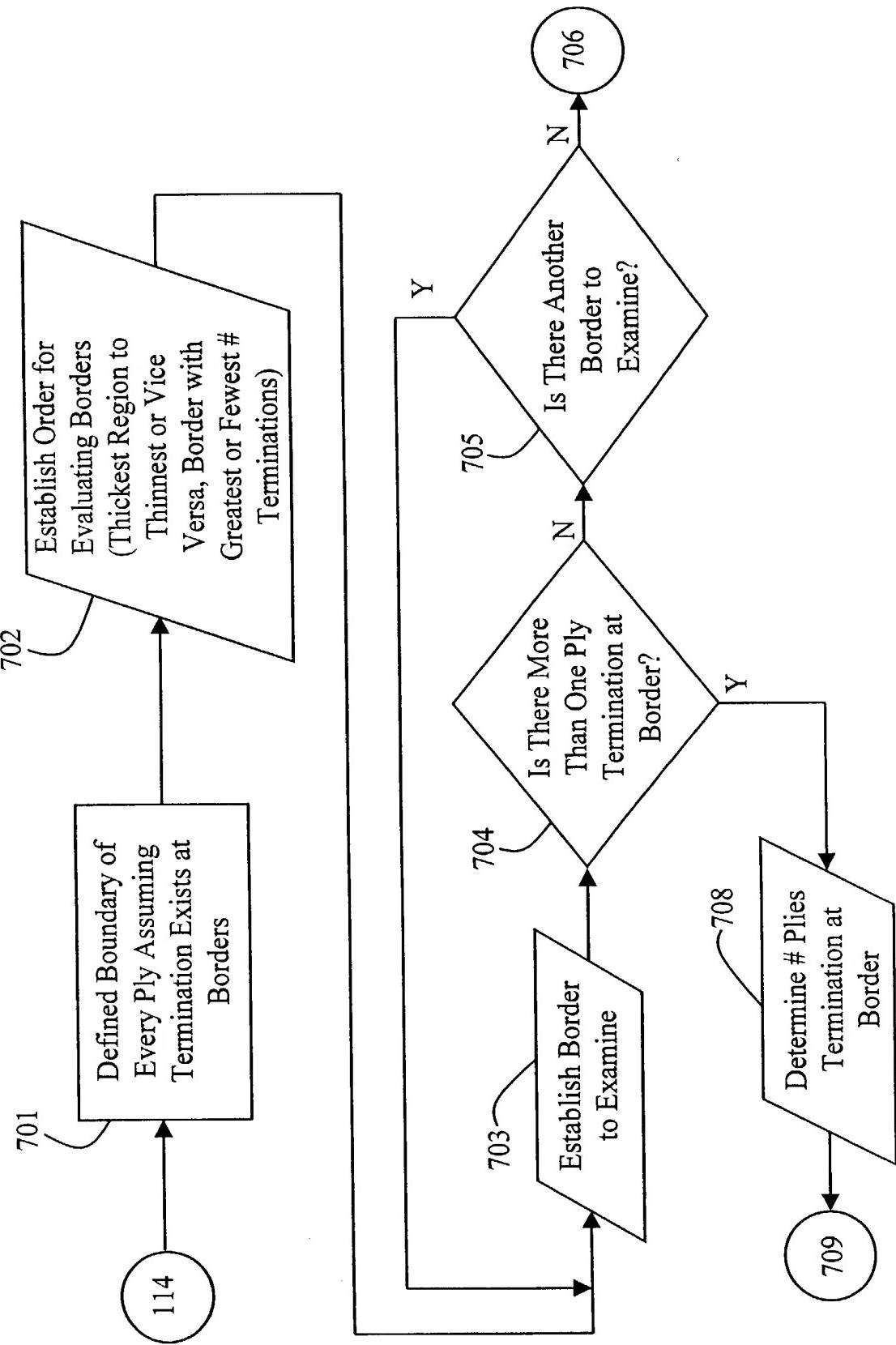
**FIG. 13C**



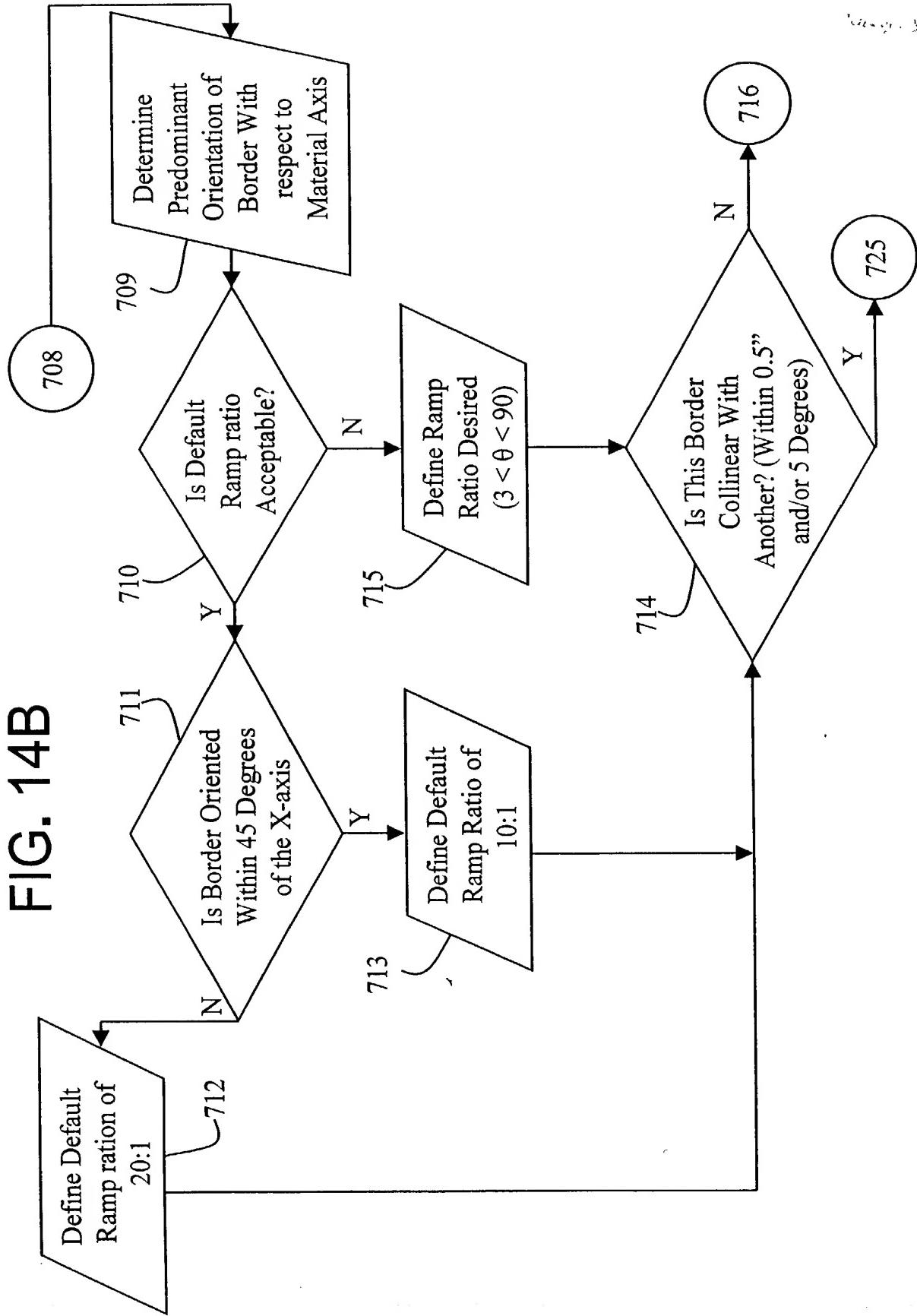
**FIG. 13B**



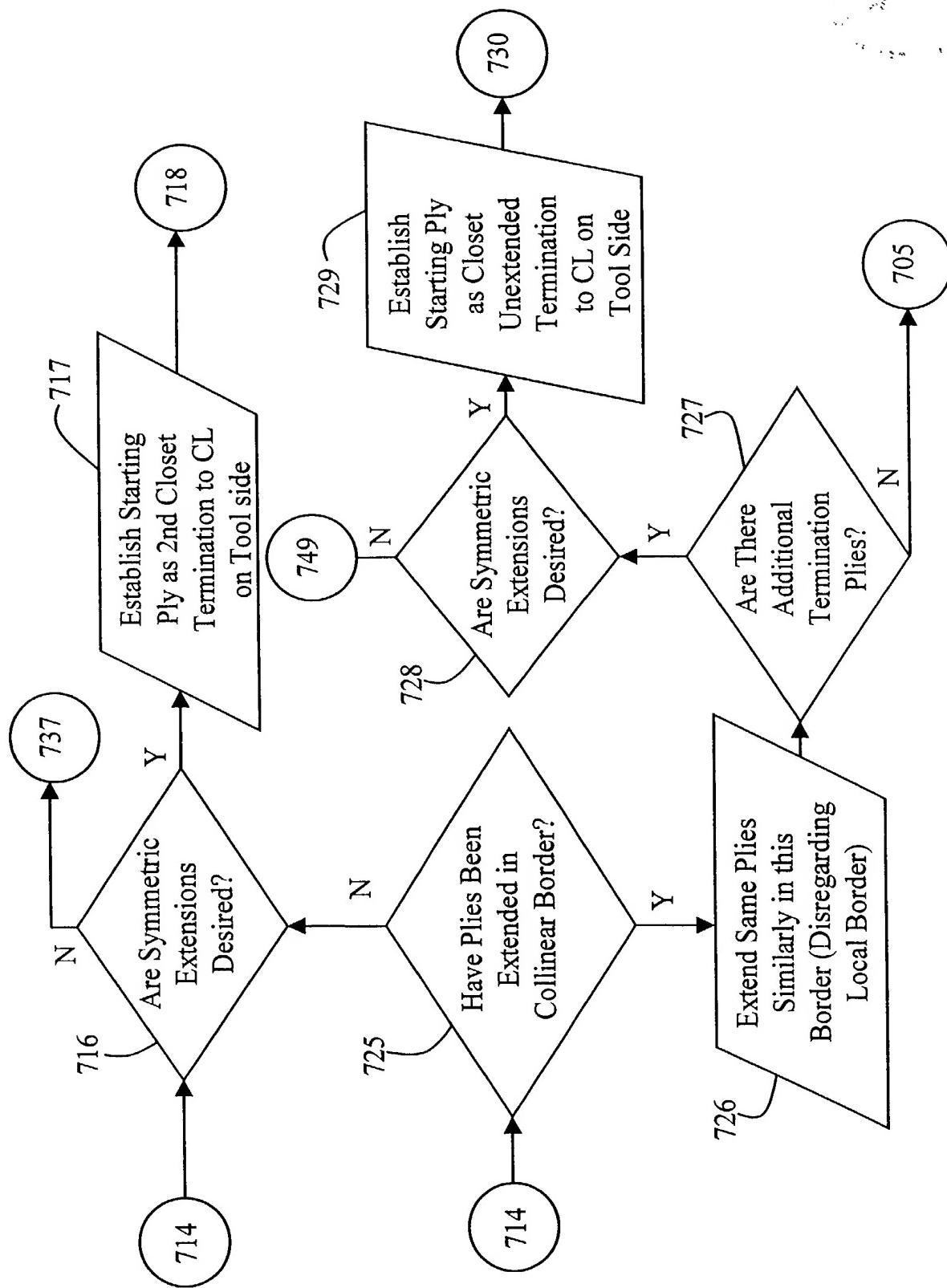
**FIG. 14A**



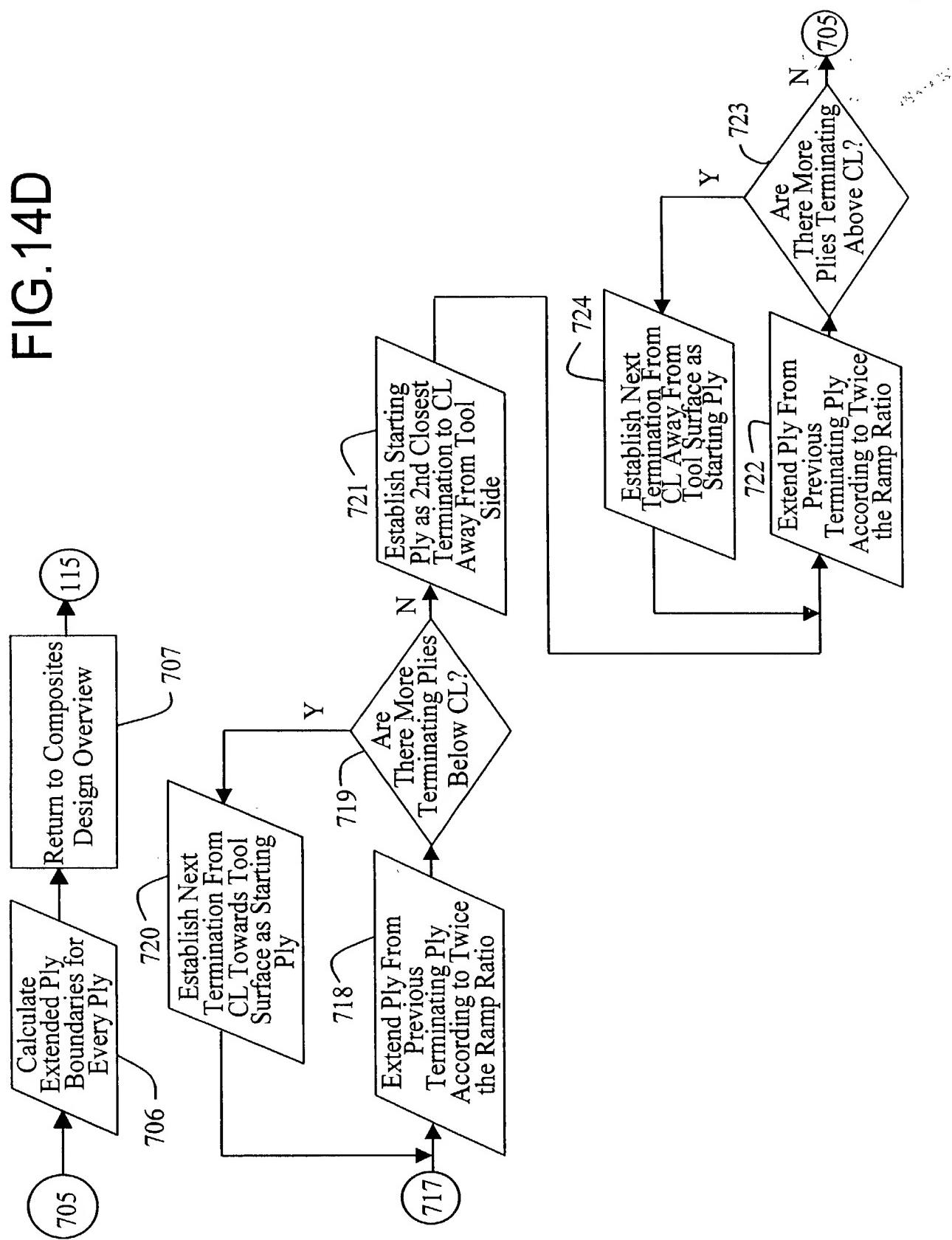
**FIG. 14B**



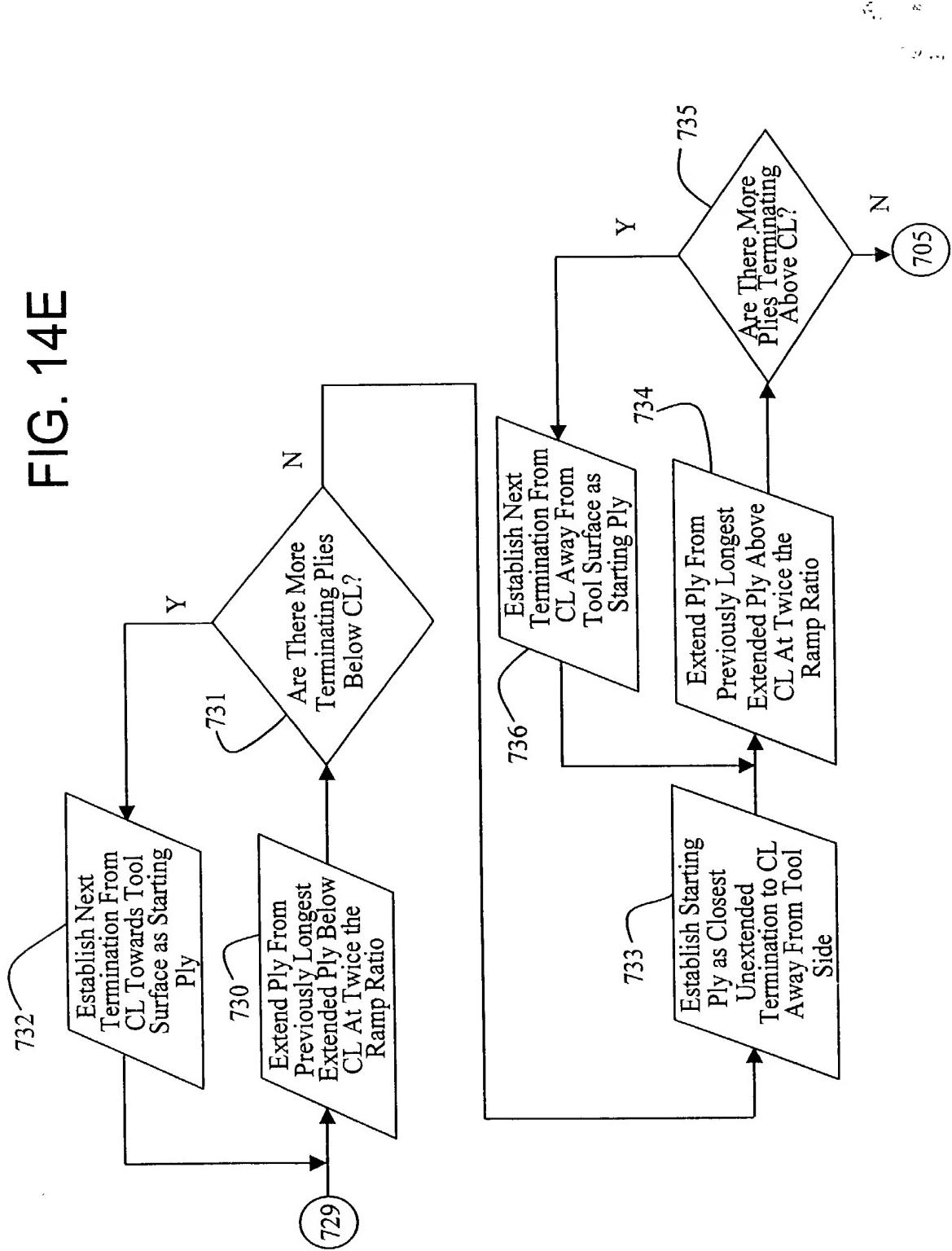
**FIG. 14C**



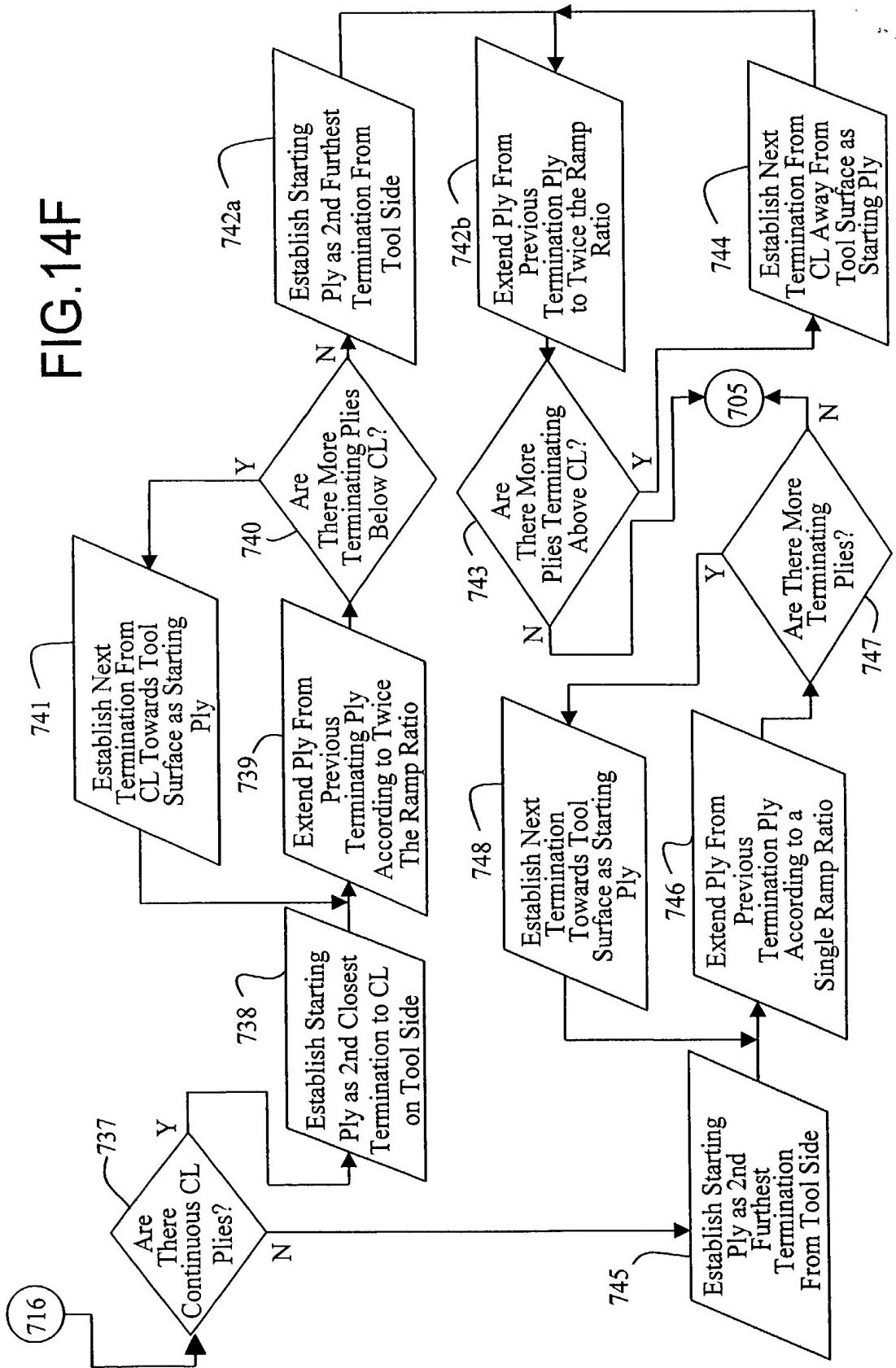
**FIG. 14D**



**FIG. 14E**

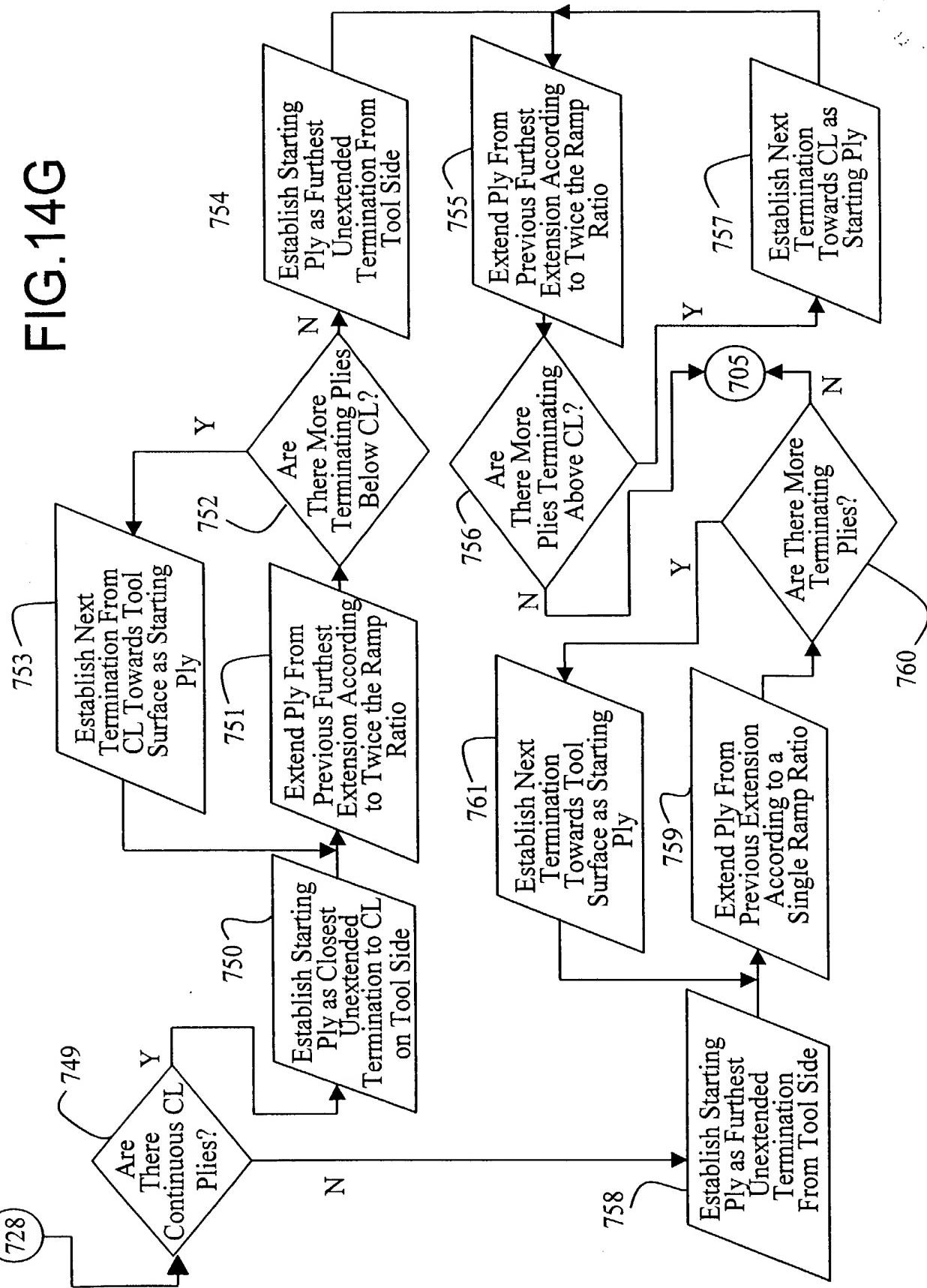


**FIG. 14F**



728

FIG. 14G

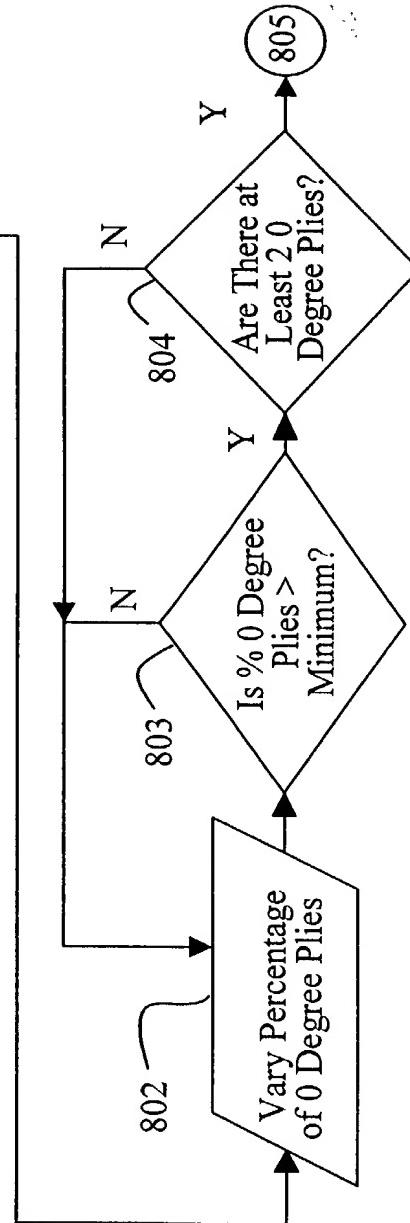


**FIG. 15A**

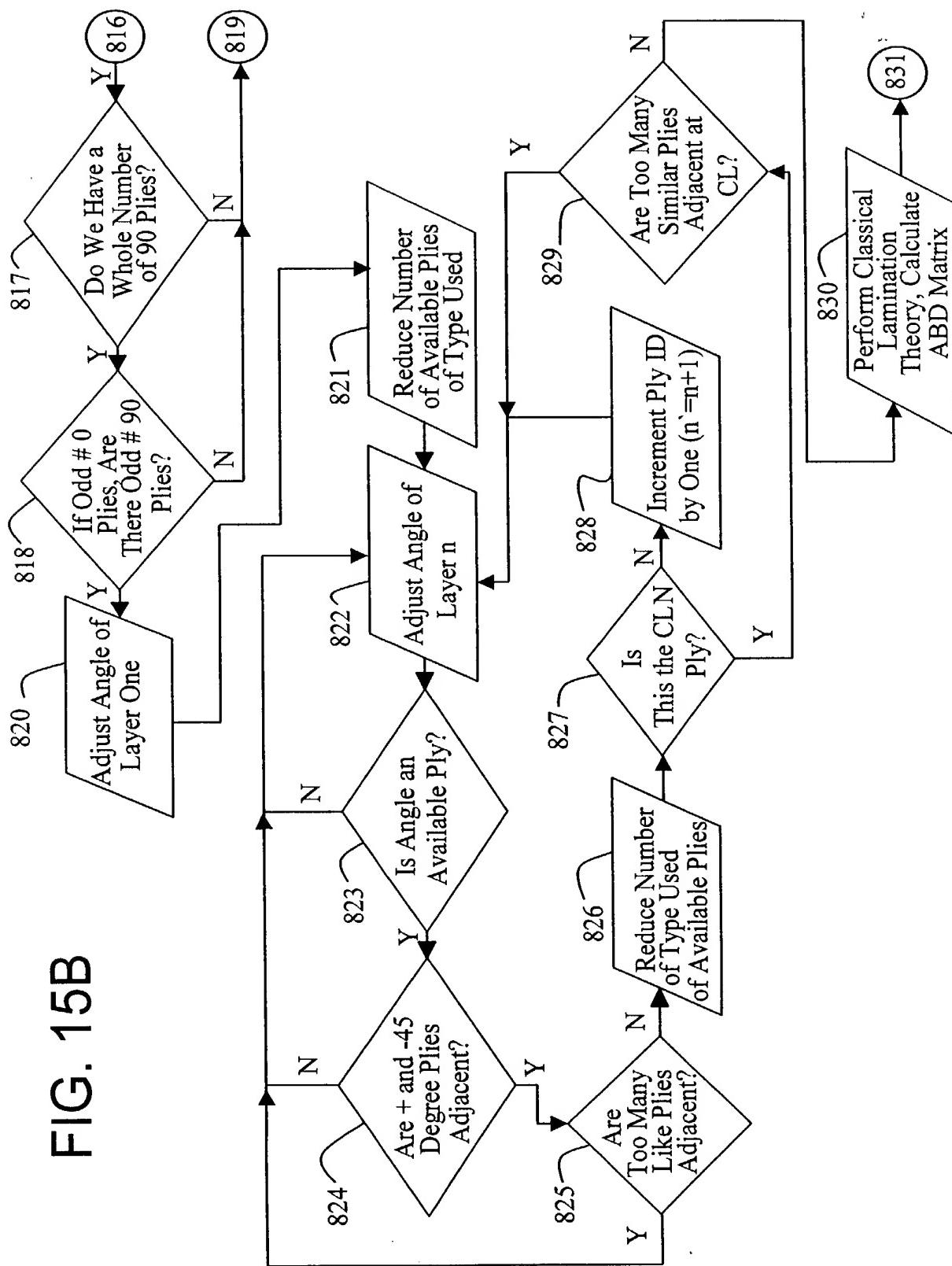
801

User Inputs: Name of saved output file, Laminate thickness, Maximum allowed thickness, Ply thickness, Number of materials, Material properties (stiffness, poisson's ratio, thermal expansion coefficients, stress and strain allowables), Laminate family, Allowed variation in family, Extreme bounds on family, Number of similar adjacent plies allowed, Surface cloth material desired for moldline panels, Loading options, Failure criteria (Max. stress, max. strain, Tsai-Hill, Bearing-Bypass), Number of load cases, Load angle with respect to material axis, In-plane loads and moments, Pressure on panel, Panel Geometry, Data reduction flags (number of desired solutions based on strength or stiffness requirements -- for strength the most positive safety margin, the least positive safety margin and a defined number of intermediate solutions; for stiffness the most and least stiff and a defined number of intermediate solutions for each primary stiffness).

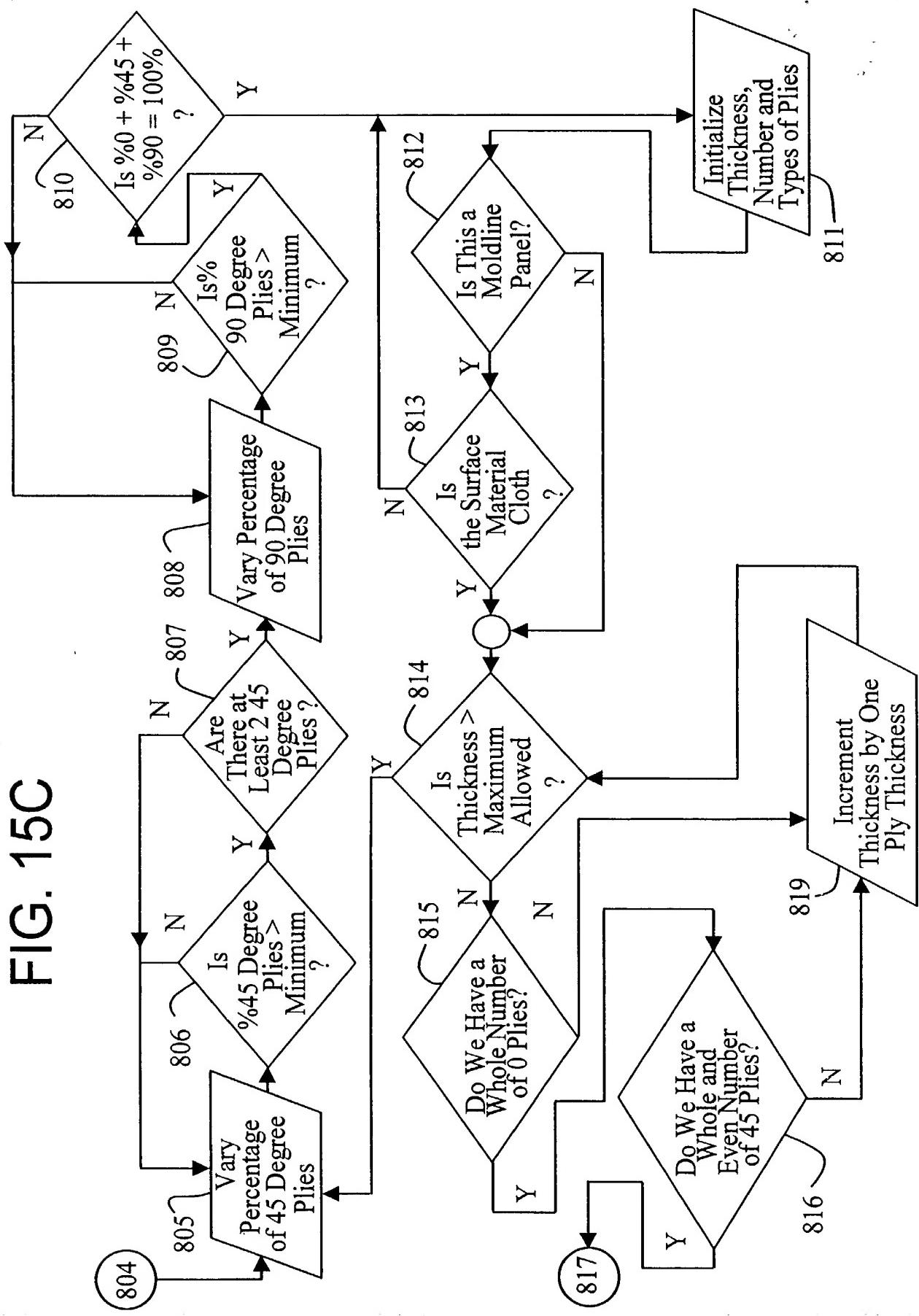
(122)



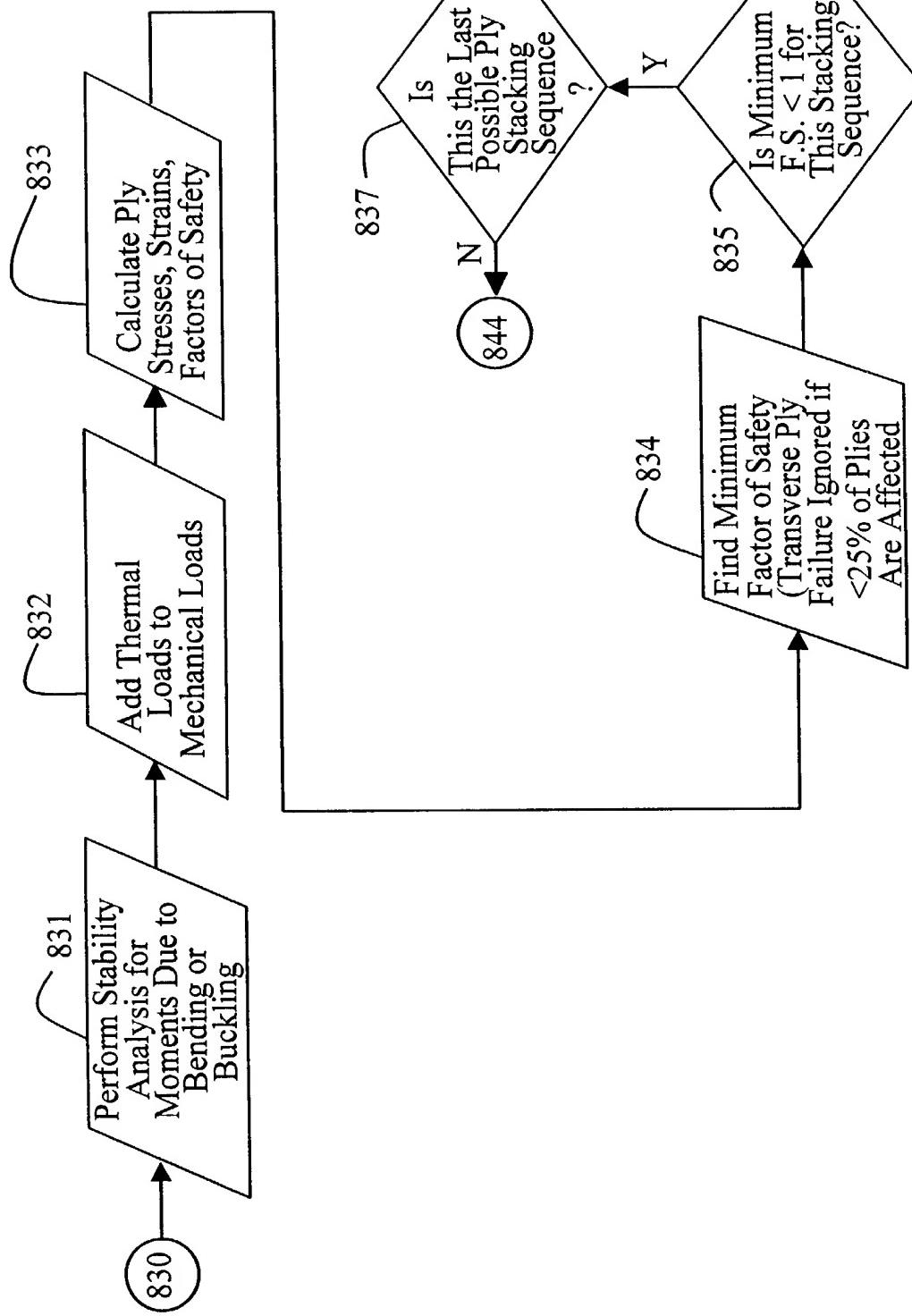
**FIG. 15B**



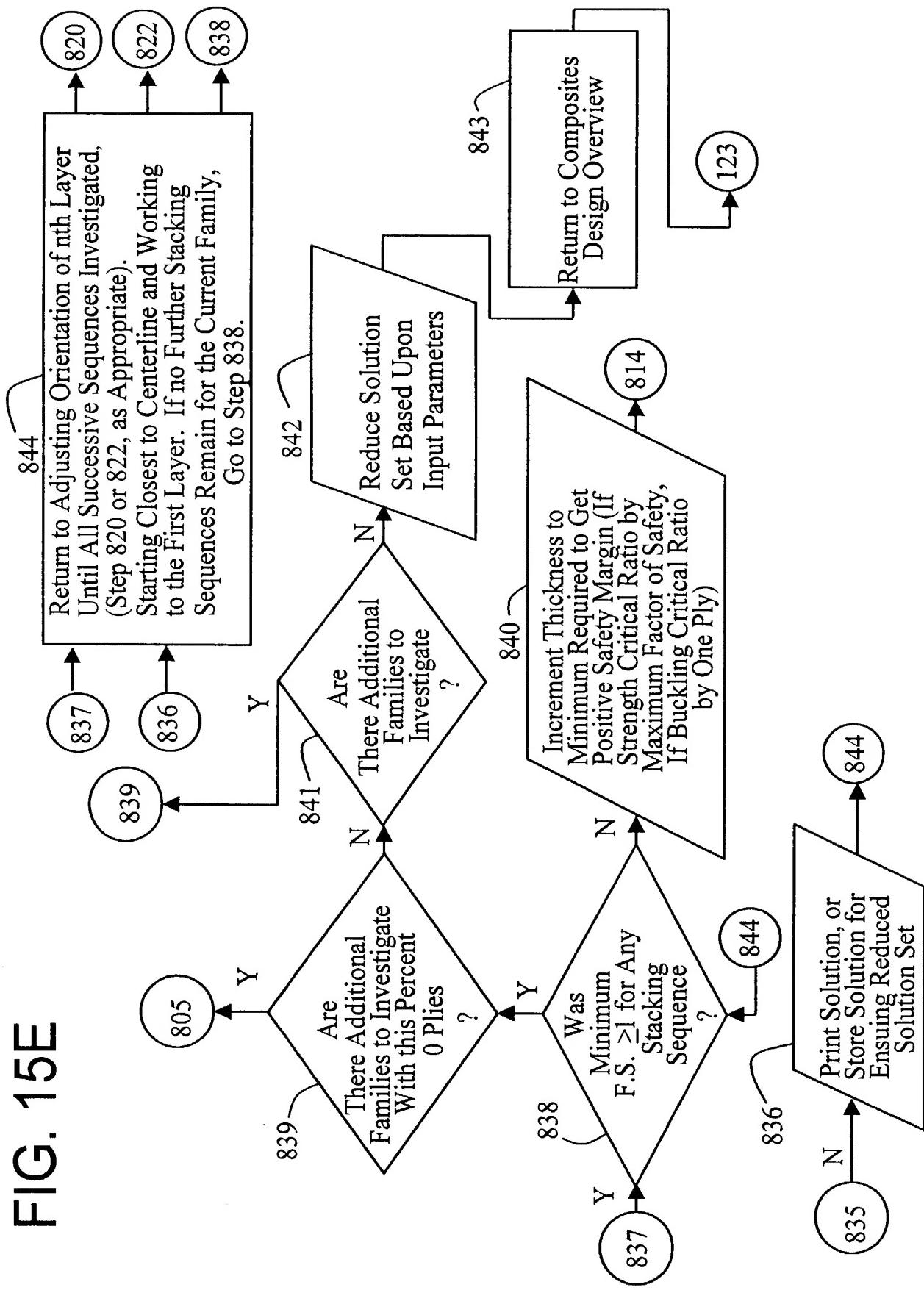
**FIG. 15C**



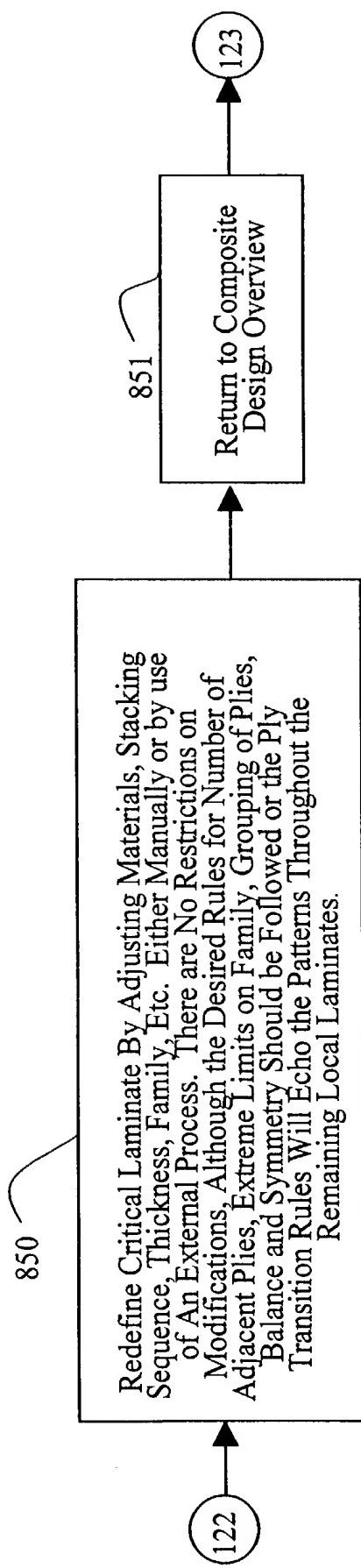
**FIG. 15D**



**FIG. 15E**

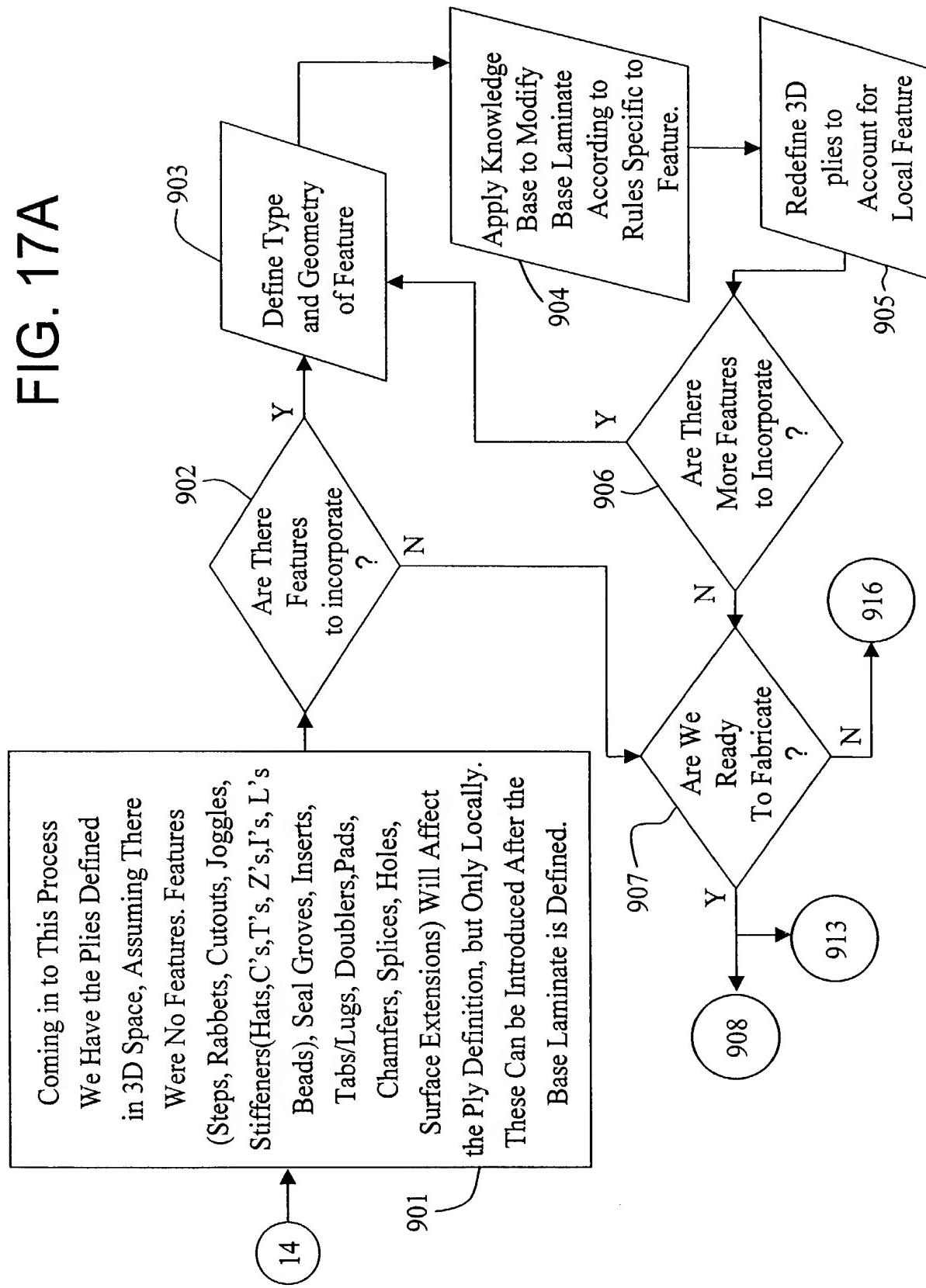


**FIG. 16**



Coming in to This Process  
We Have the Plies Defined  
in 3D Space, Assuming There  
Were No Features. Features  
(Steps, Rabbets, Cutouts, Joggles,  
Stiffeners(Hats,C's,T's,Z's,I's,L's  
Beads), Seal Groves, Inserts,  
Tabs/Lugs, Doublers,Pads,  
Chamfers, Splices, Holes,  
Surface Extensions) Will Affect  
the Ply Definition, but Only Locally.  
These Can be Introduced After the  
Base Laminate is Defined.

**FIG. 17A**



**FIG. 17B**

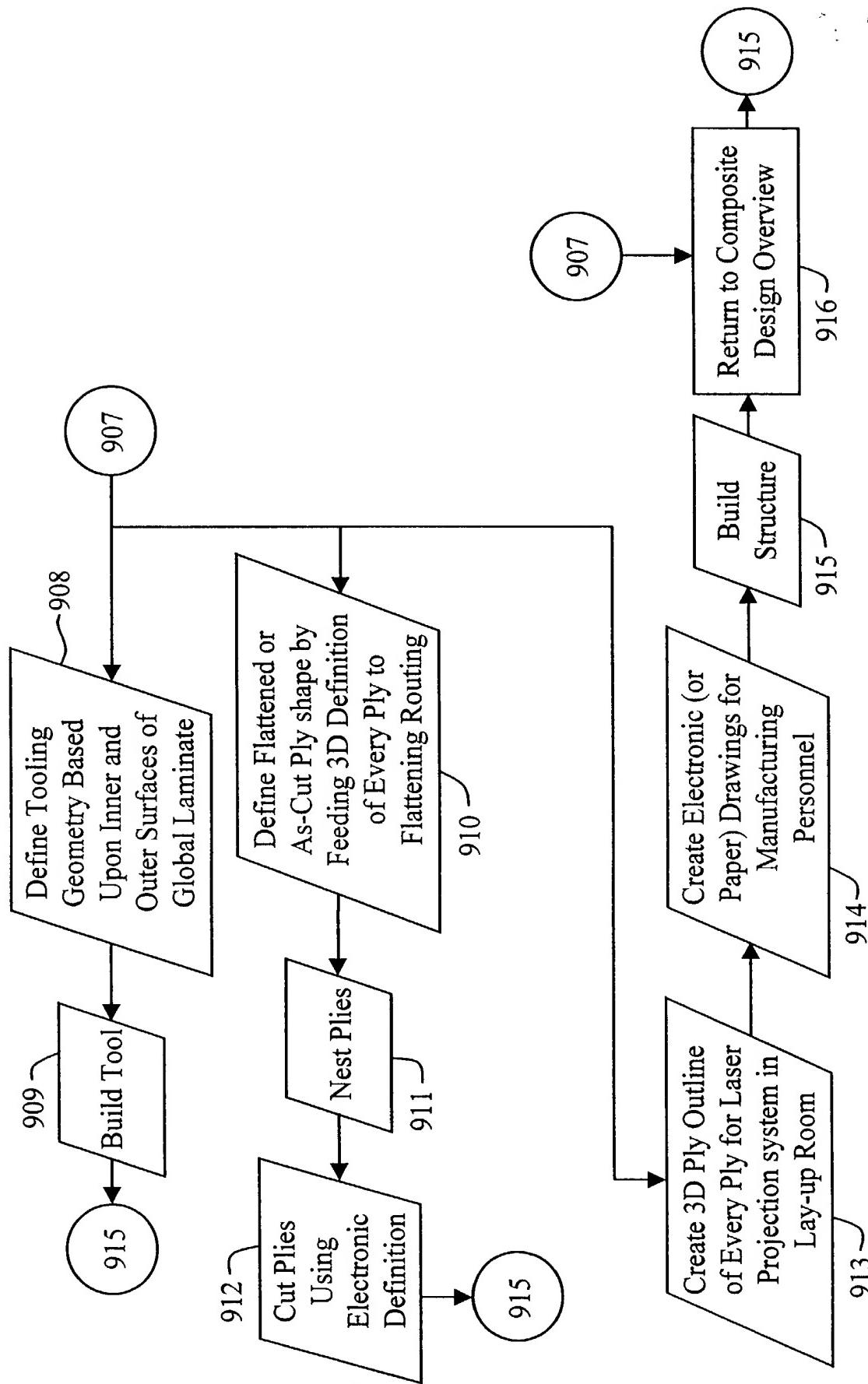


FIG. 18

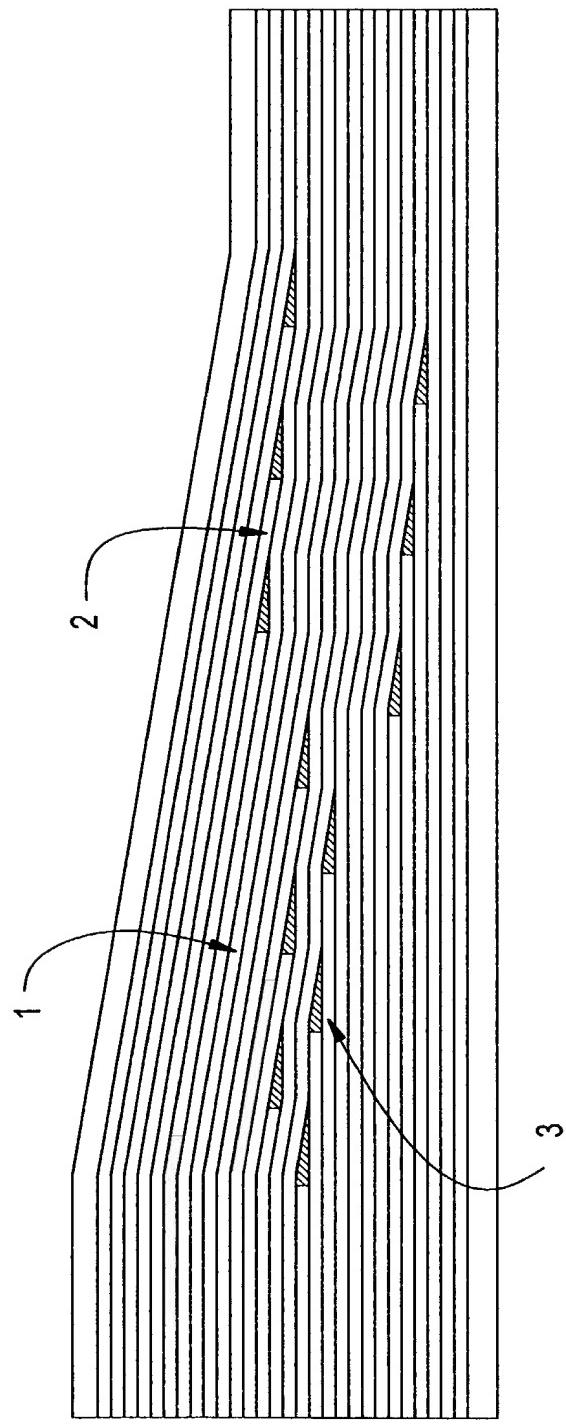


FIG. 19

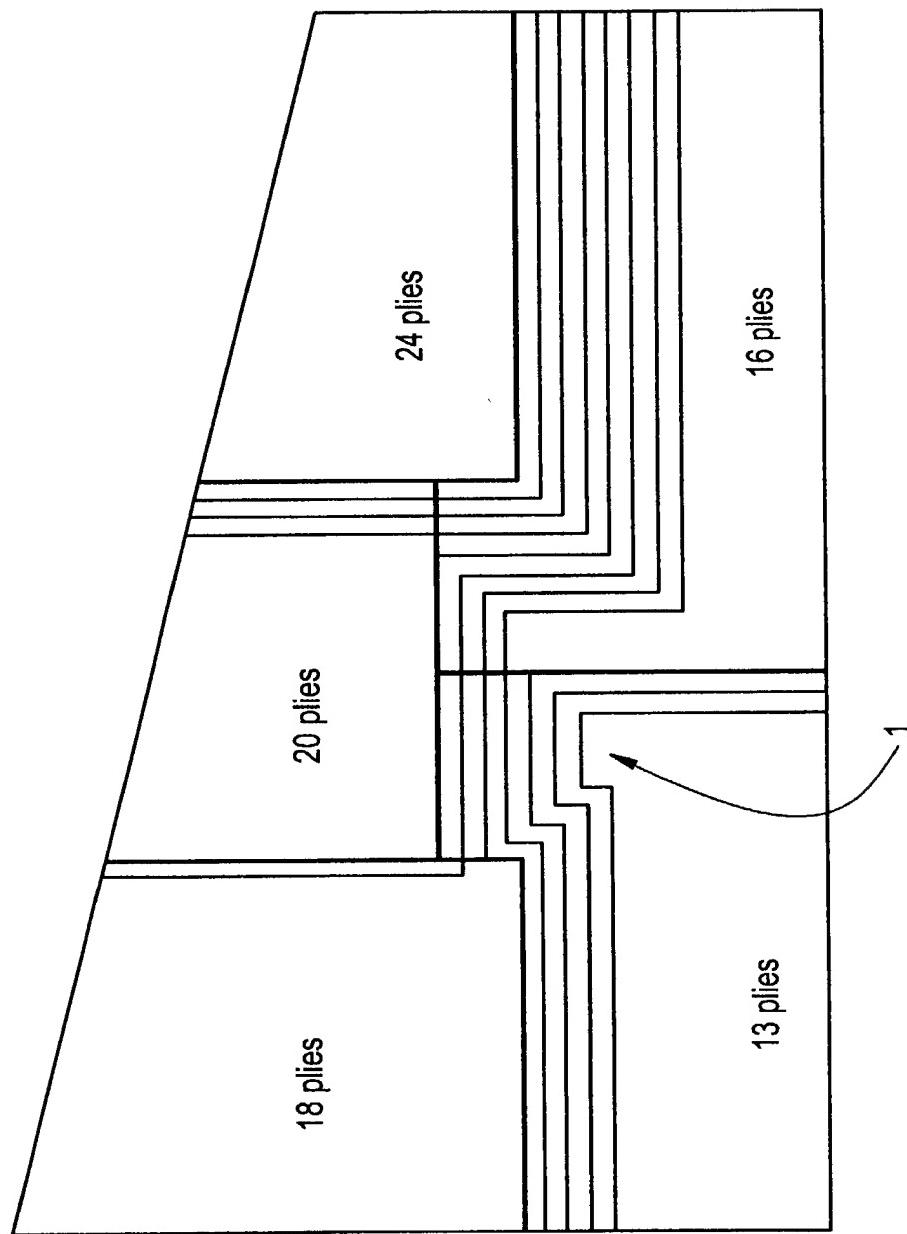


FIG. 20

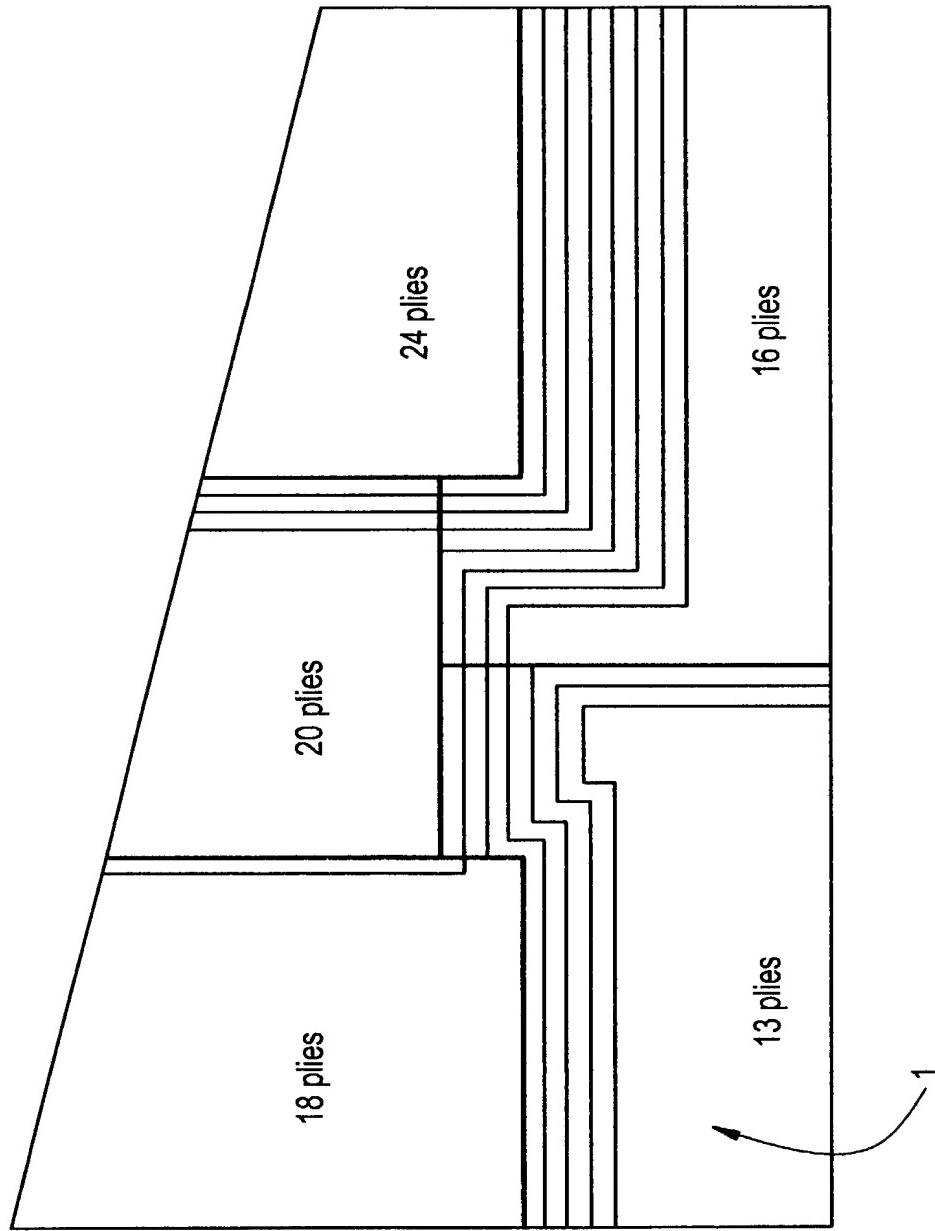
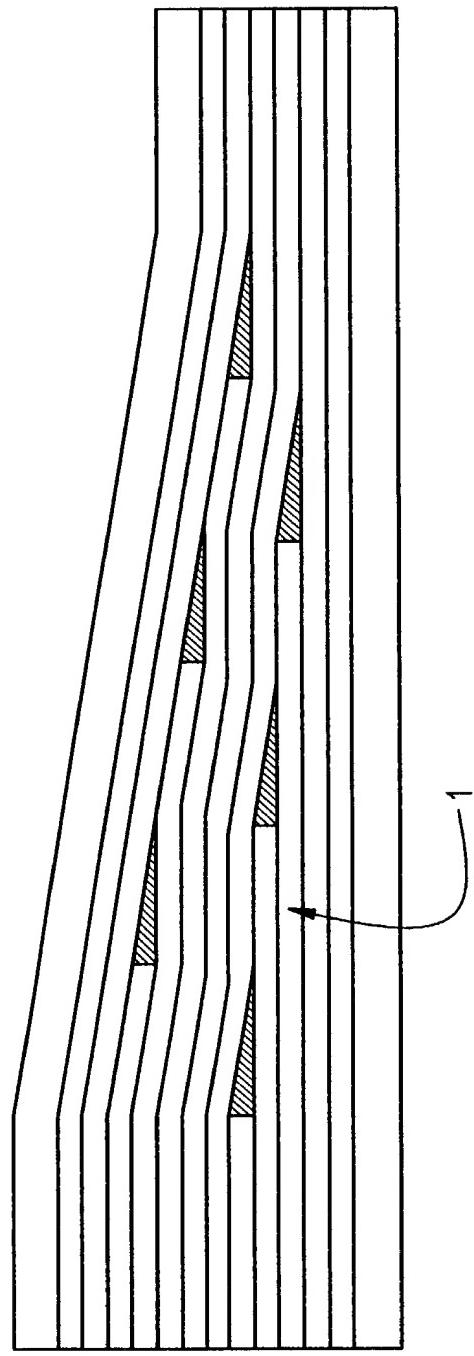


FIG. 21



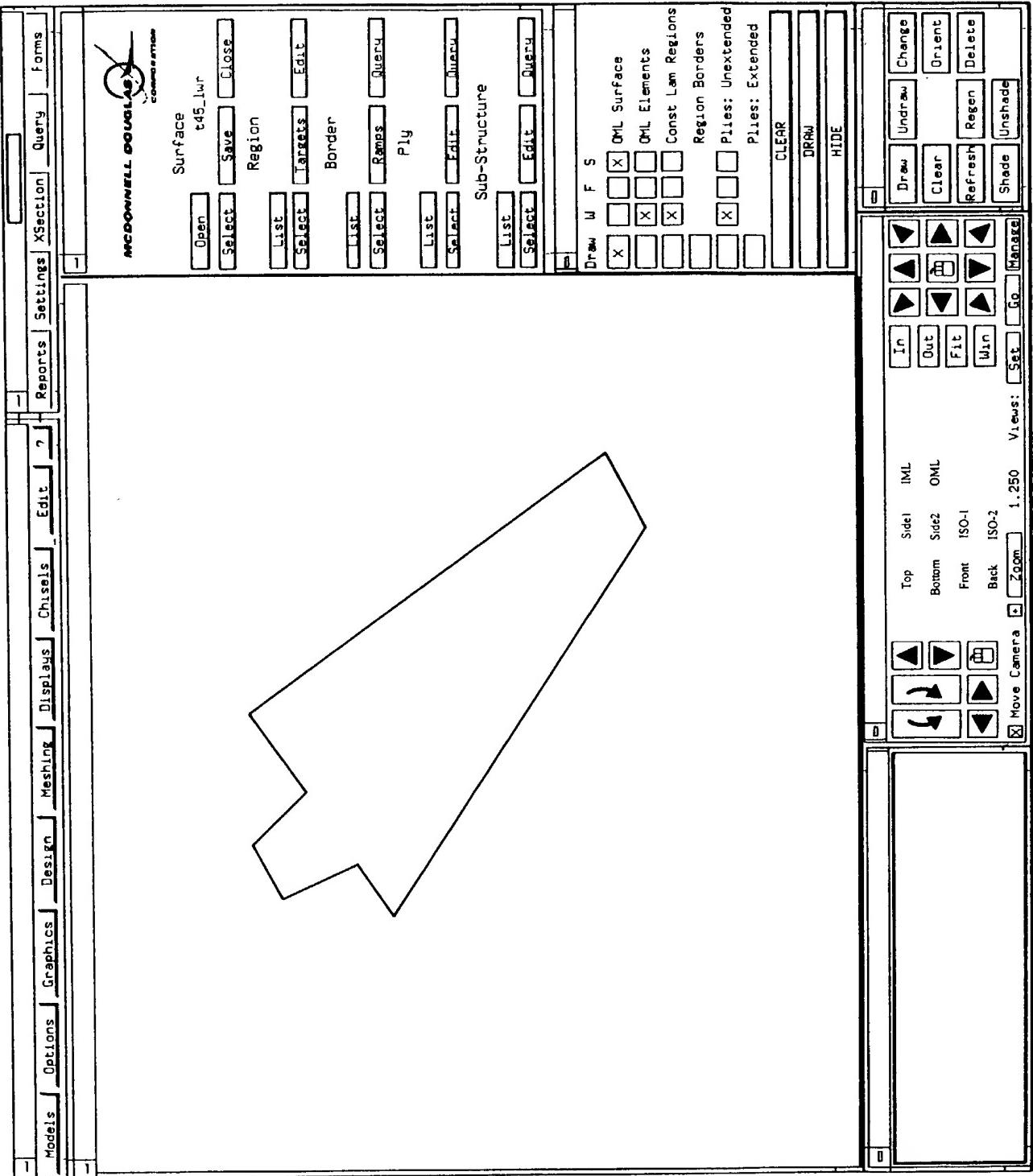


FIG. 22

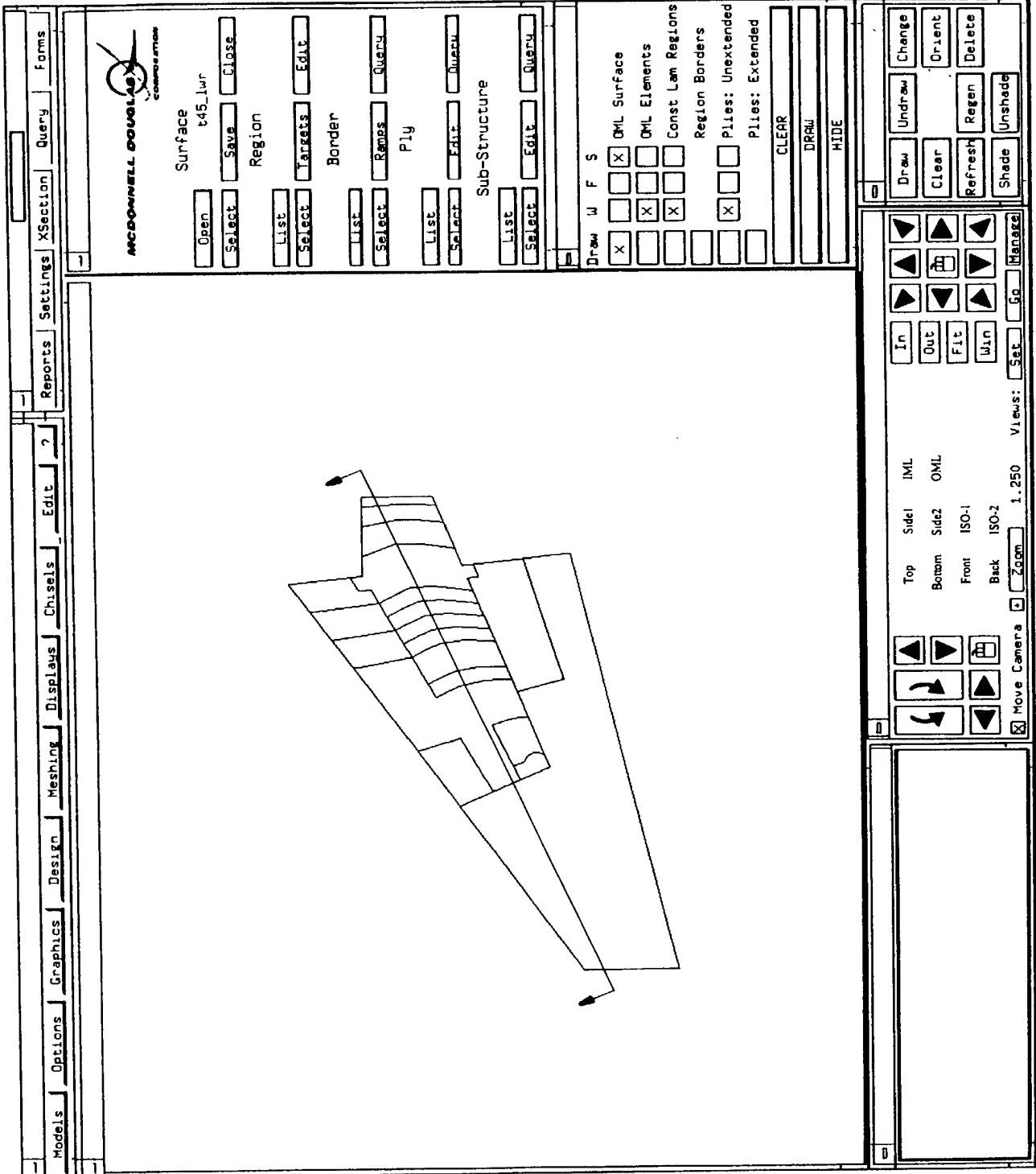


FIG. 23

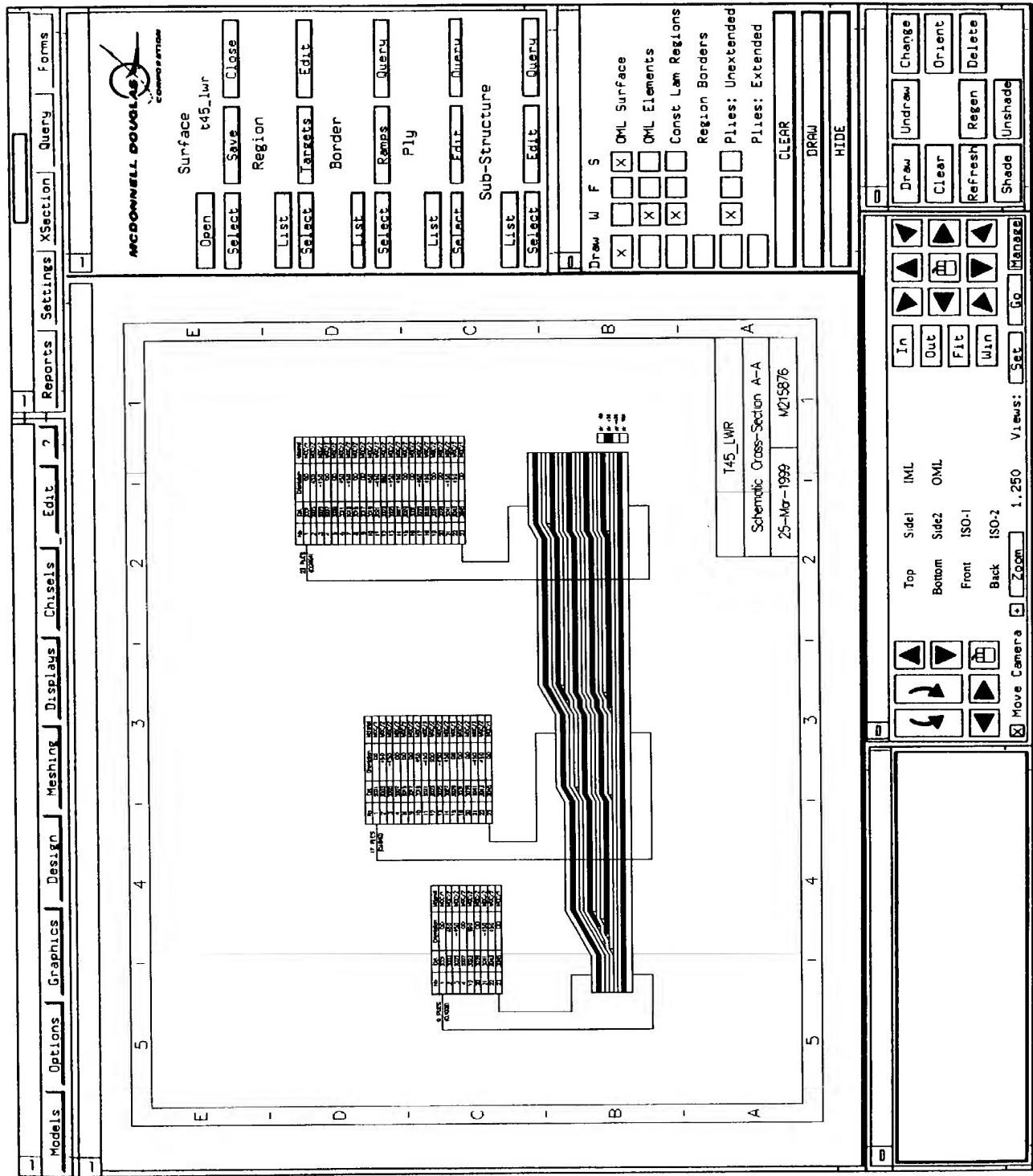
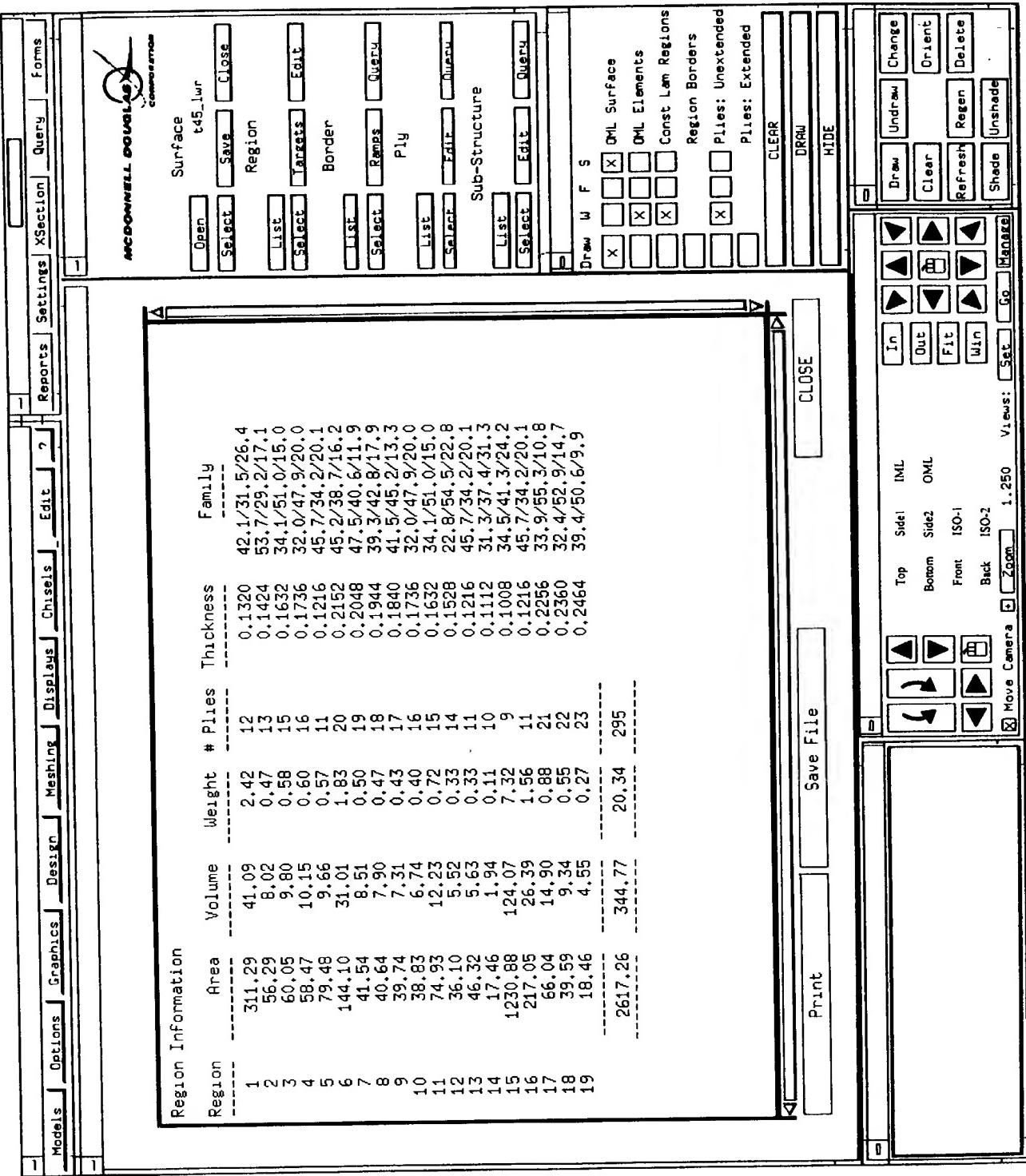
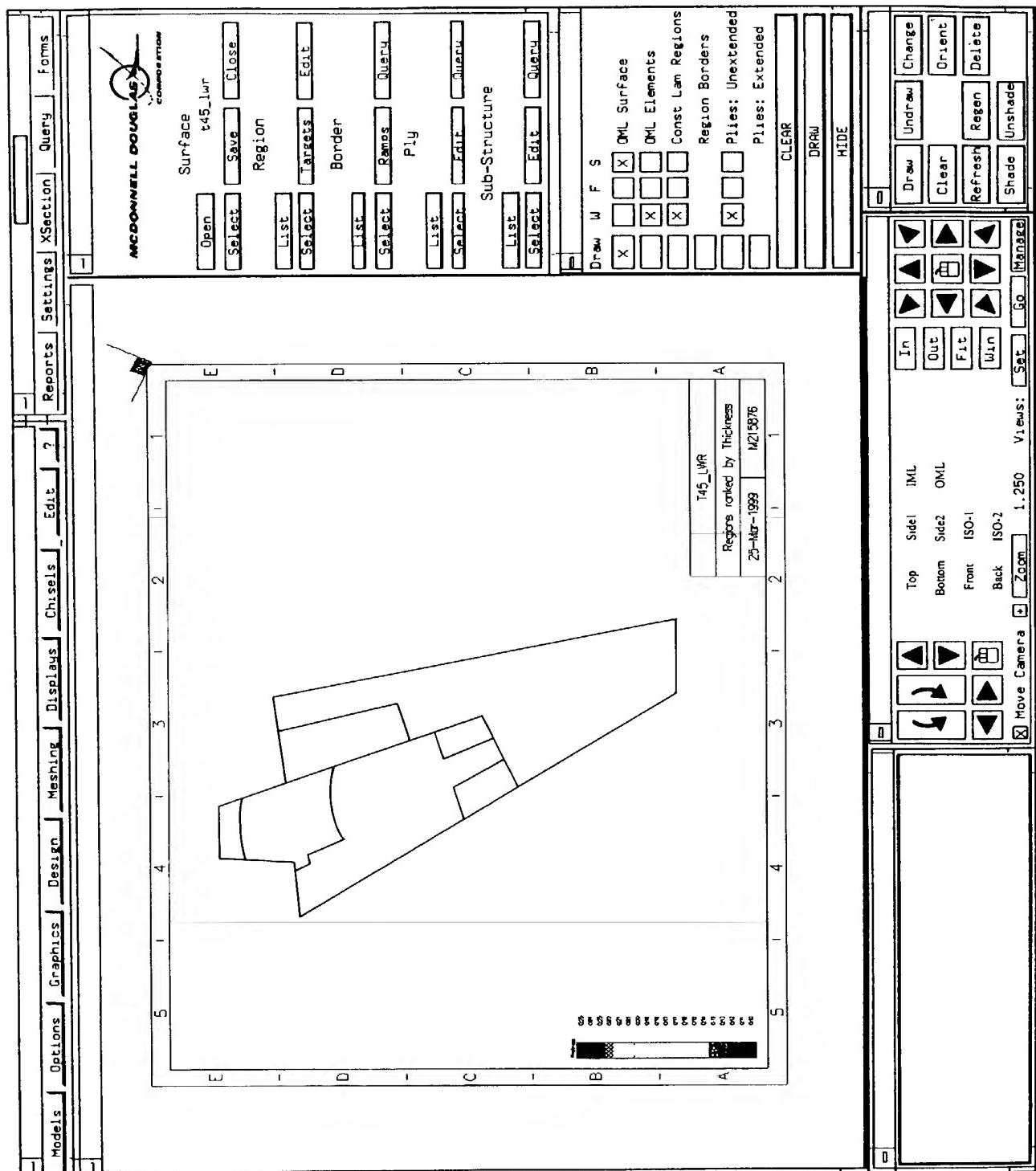


FIG. 24

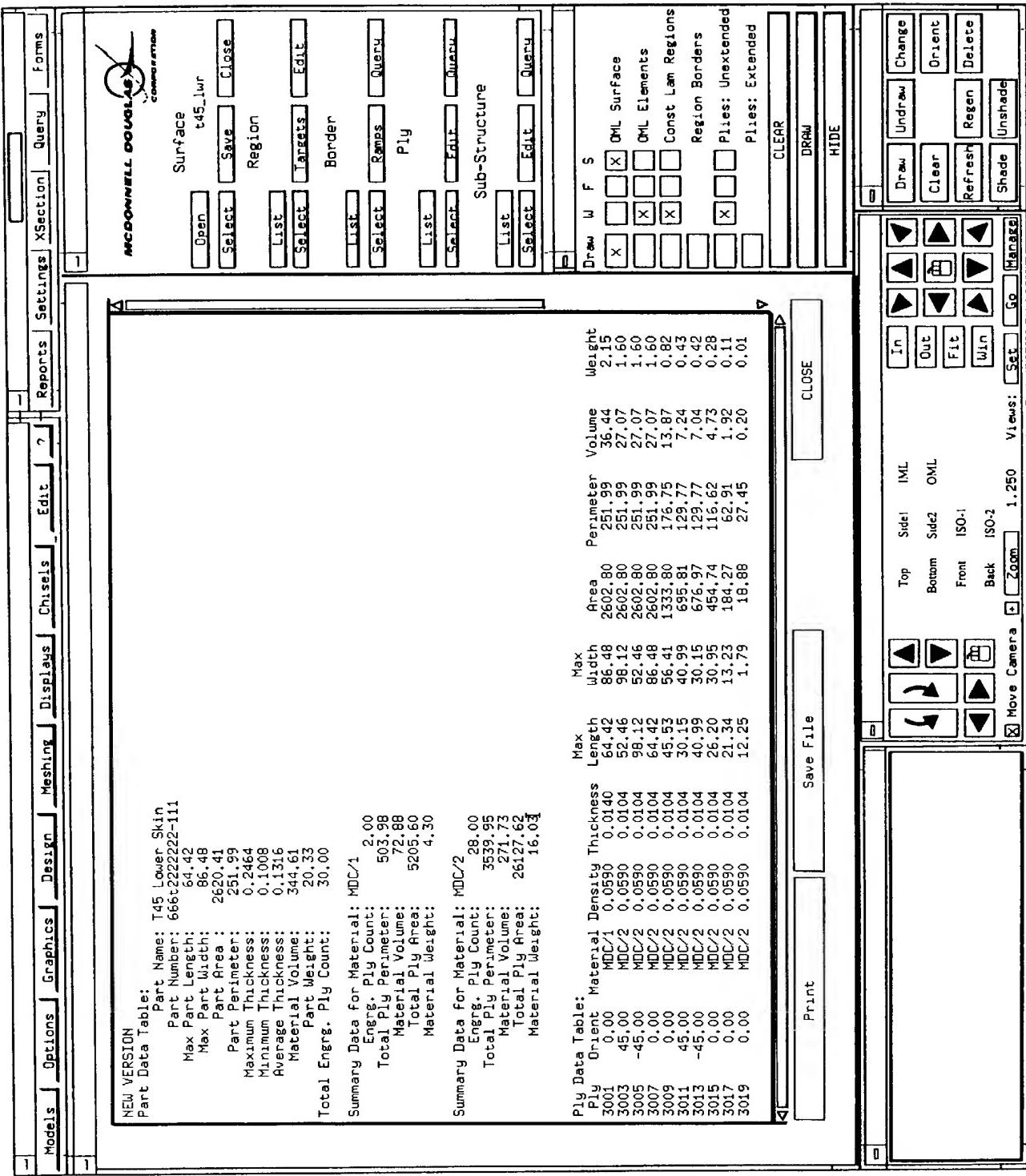
**FIG. 25**



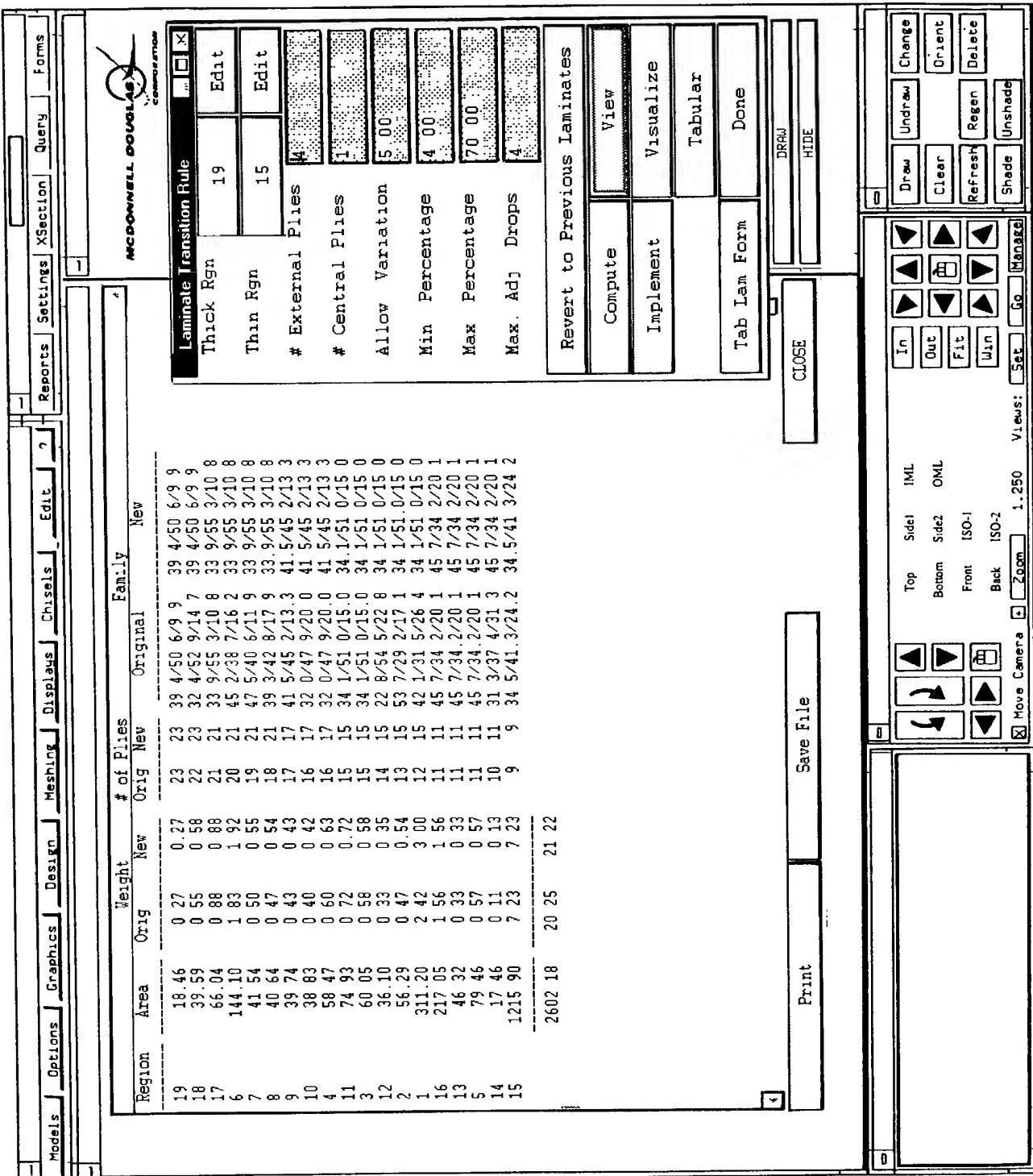
**FIG. 26**



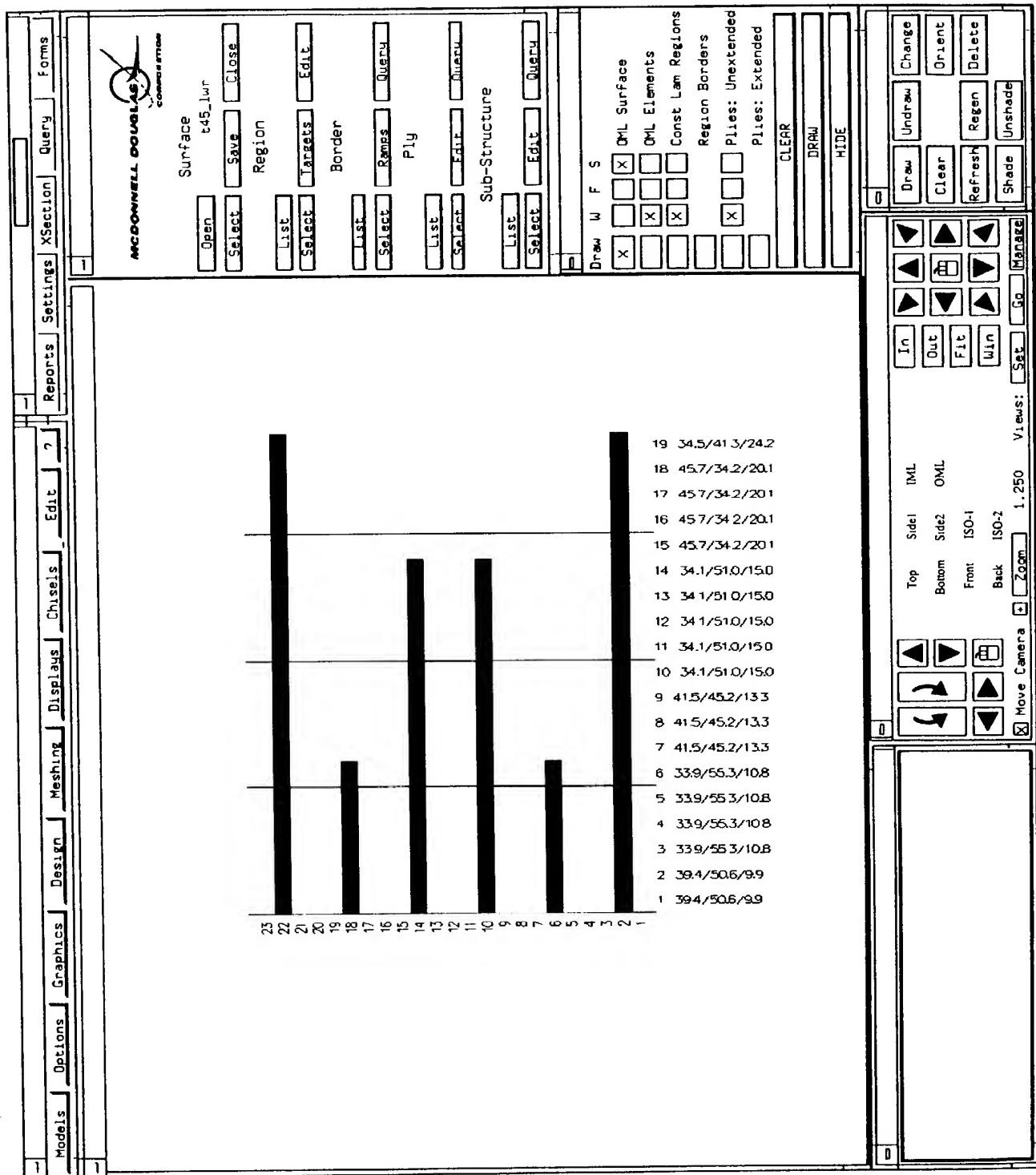
**FIG. 27**



**FIG. 28**



**FIG. 29**



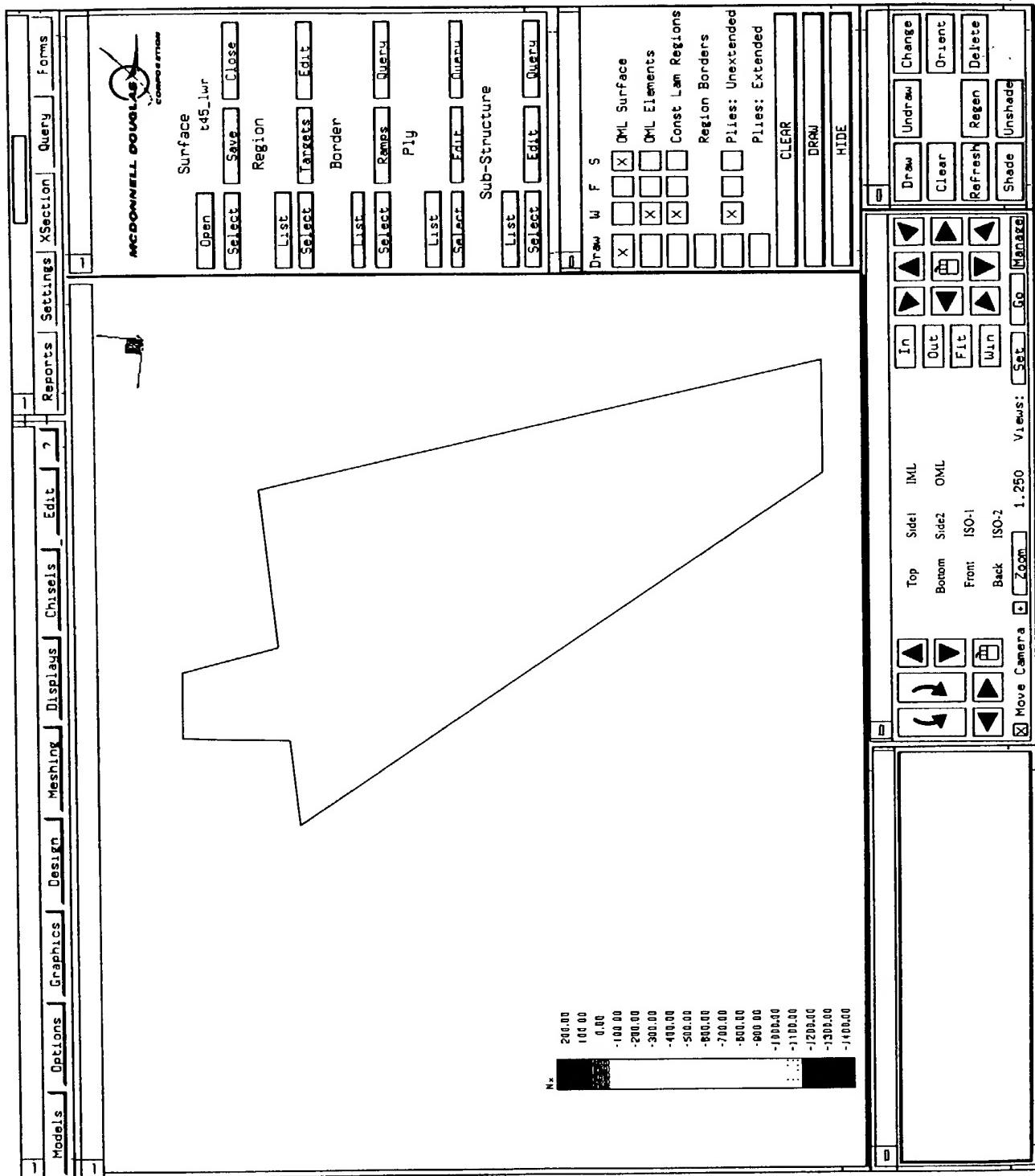
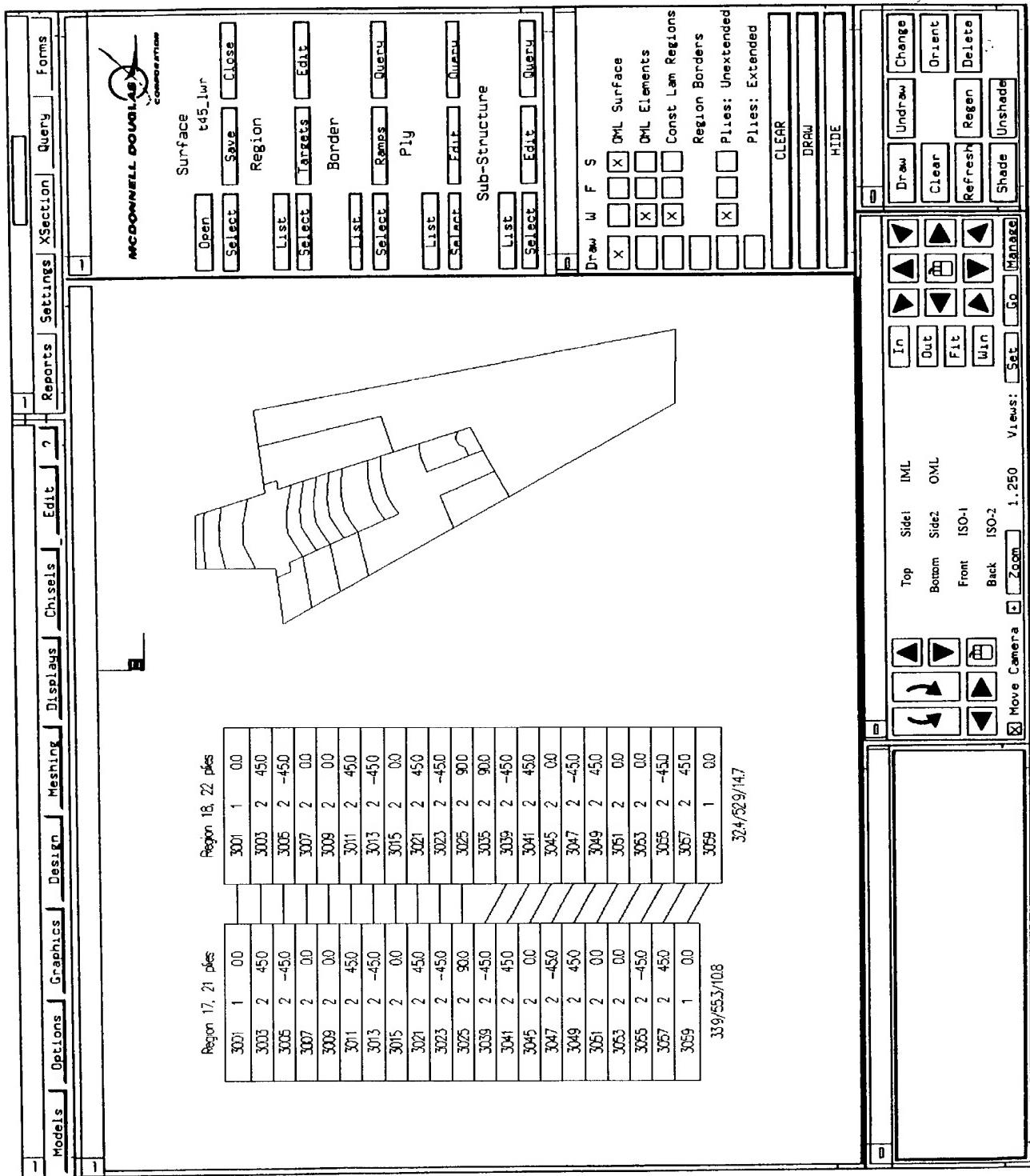
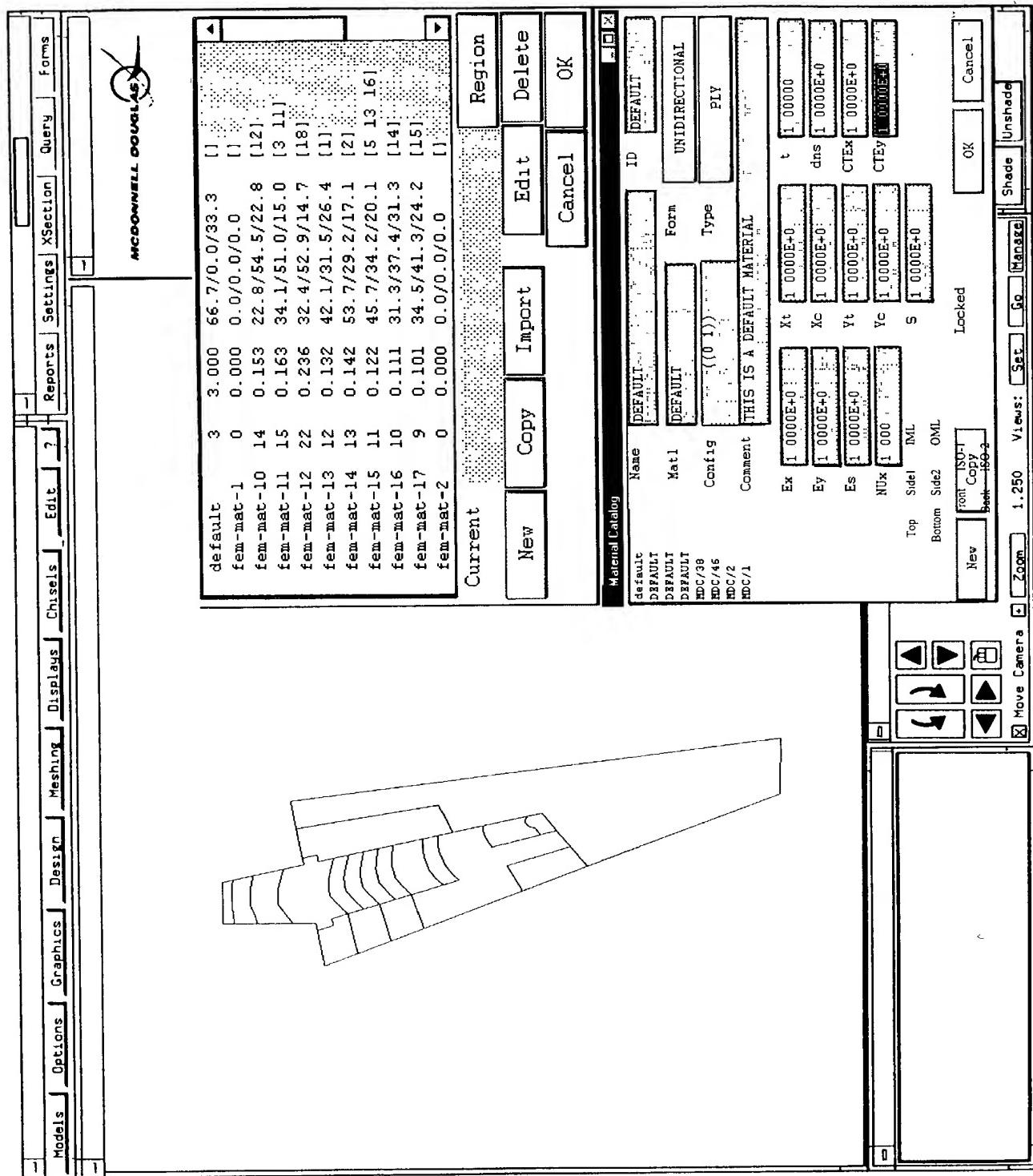


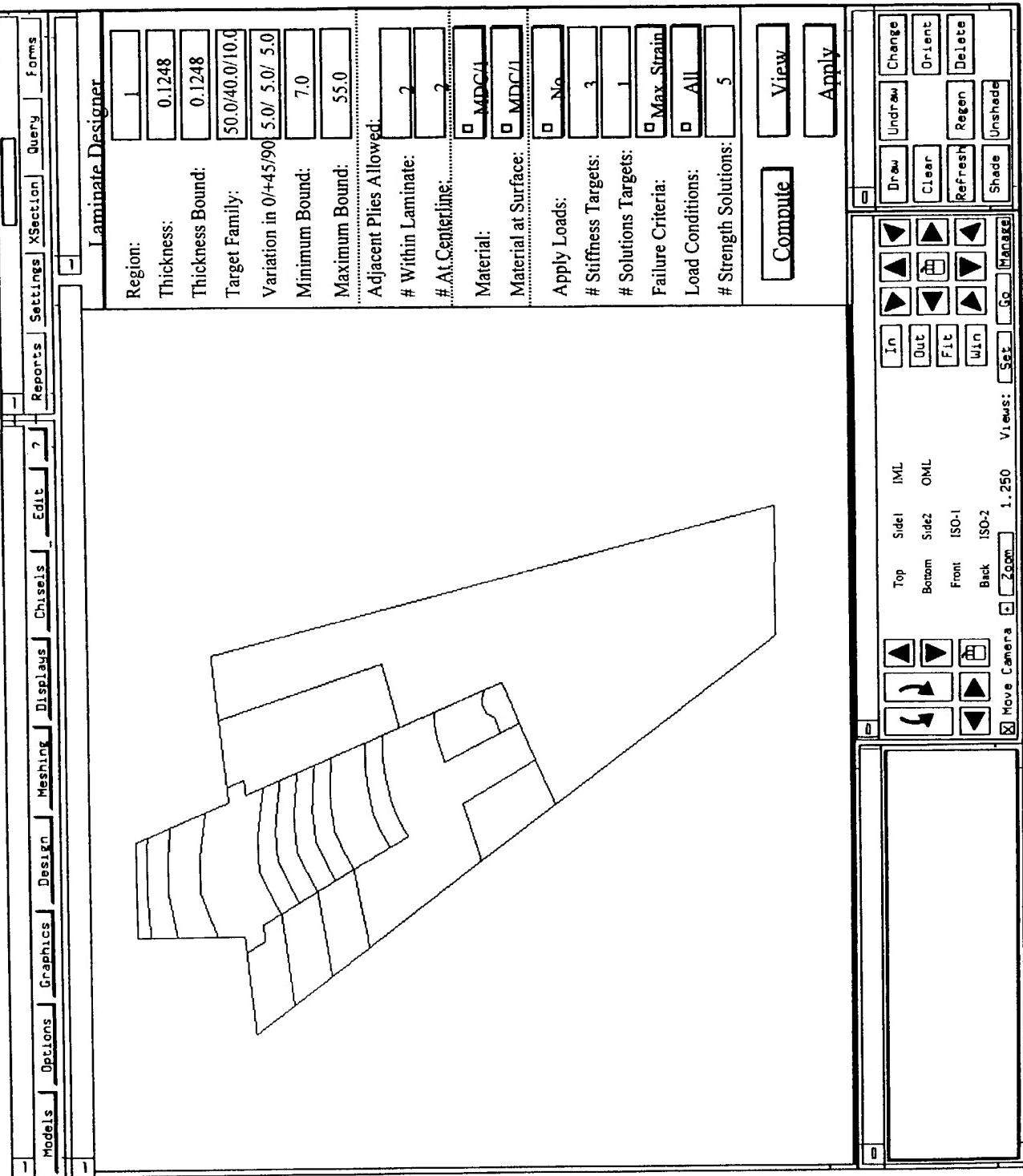
FIG. 30

**FIG. 31**



**FIG. 32**





**FIG. 33**

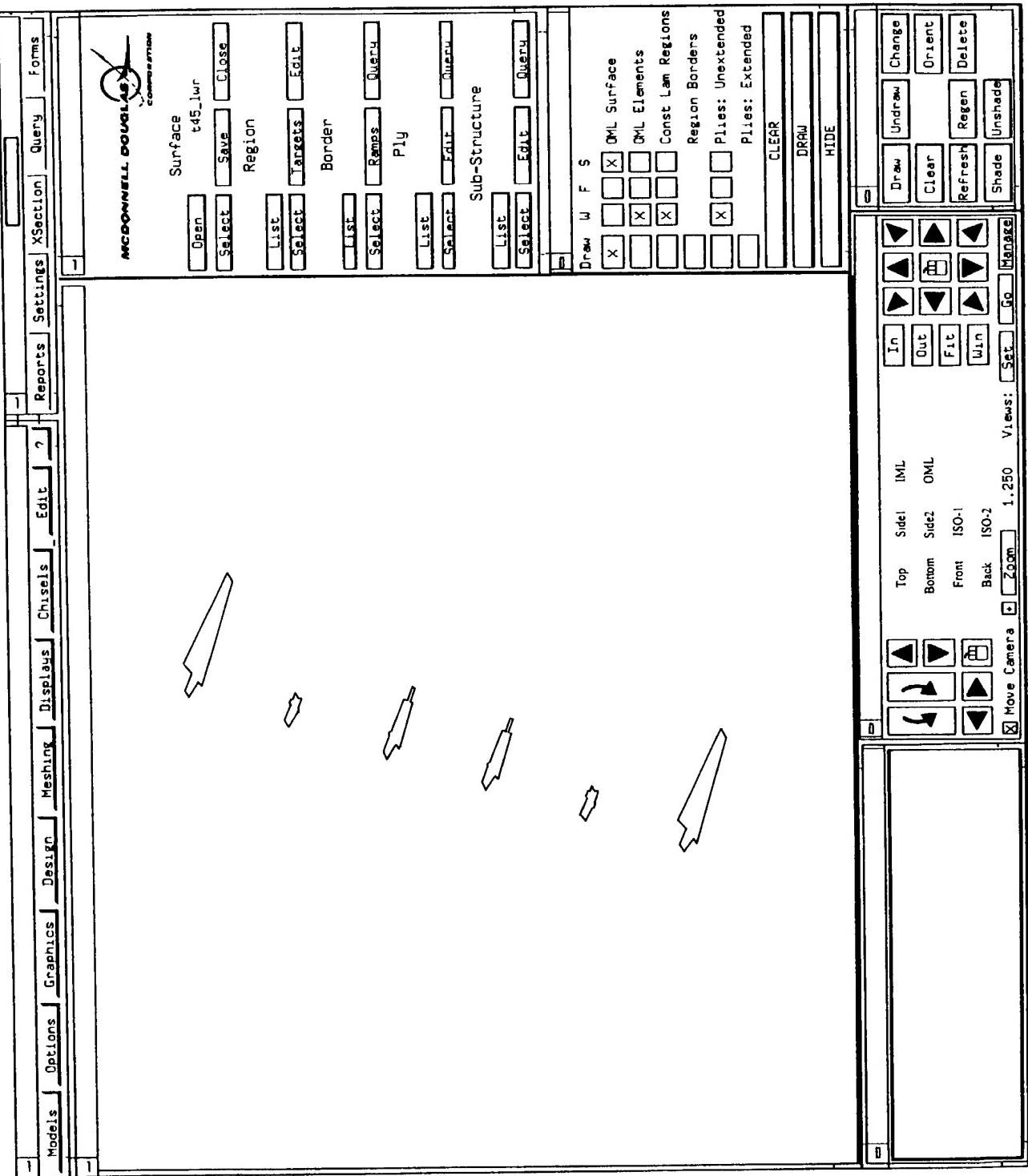
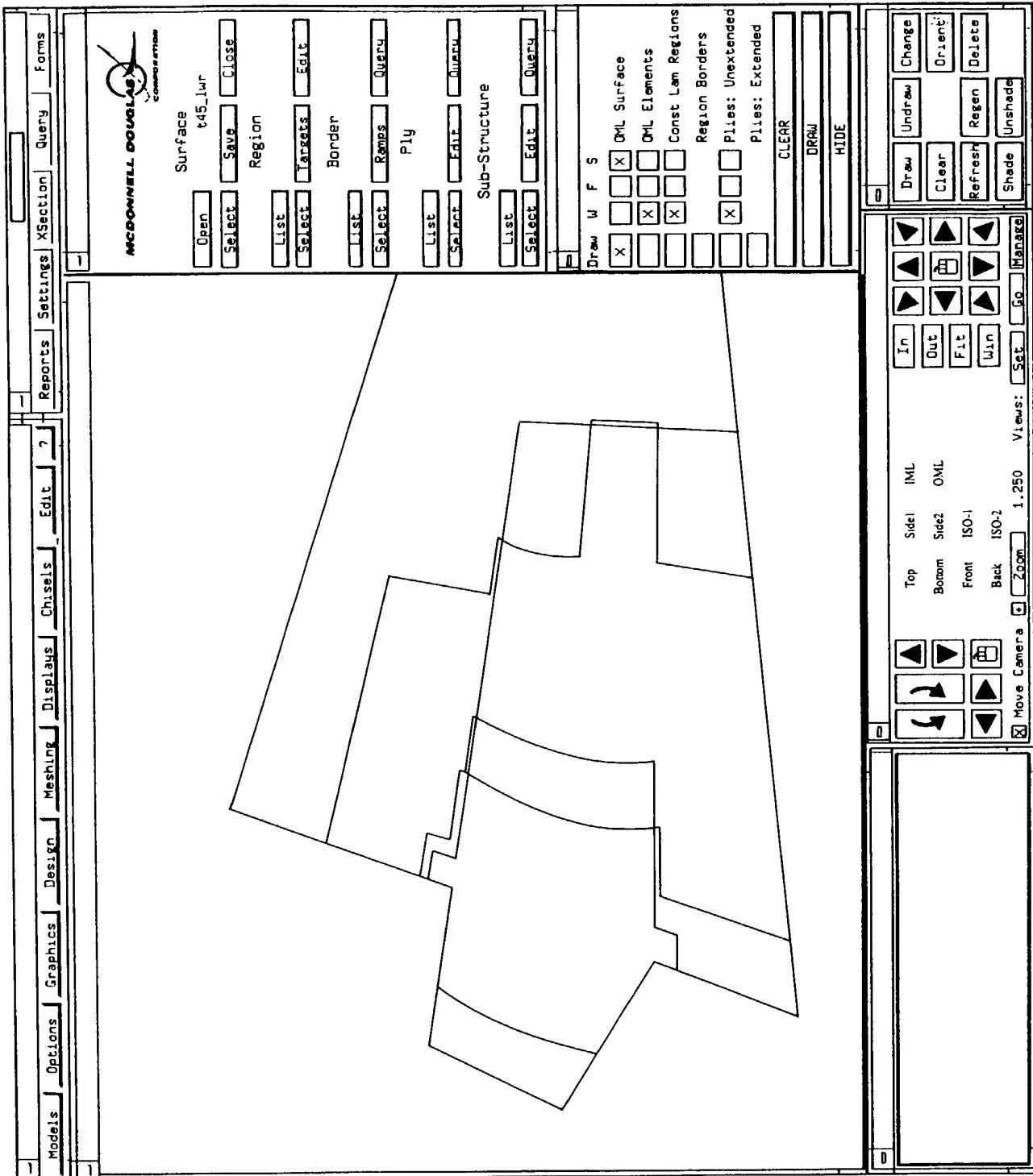


FIG. 34



**FIG. 35**

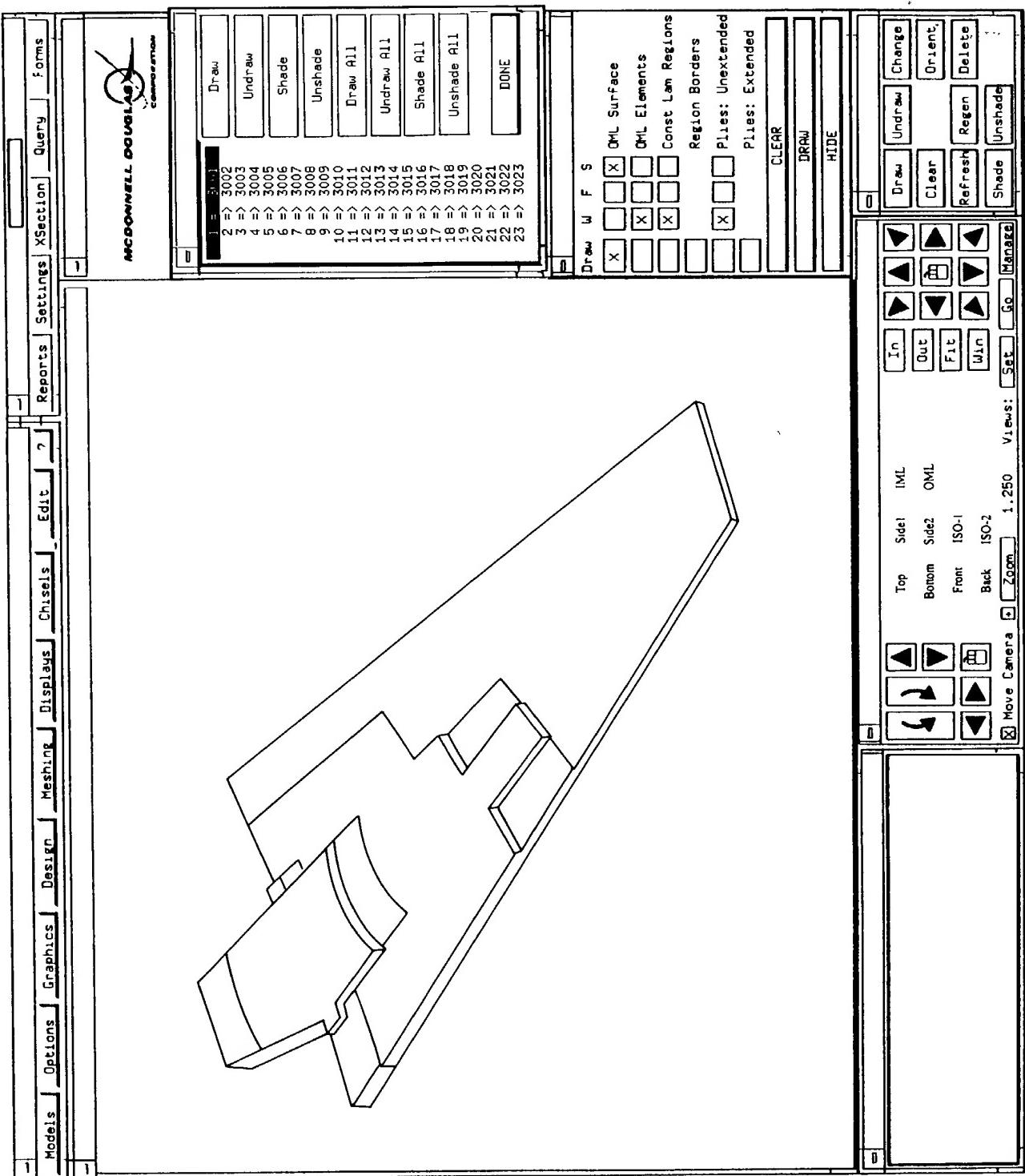


FIG. 36

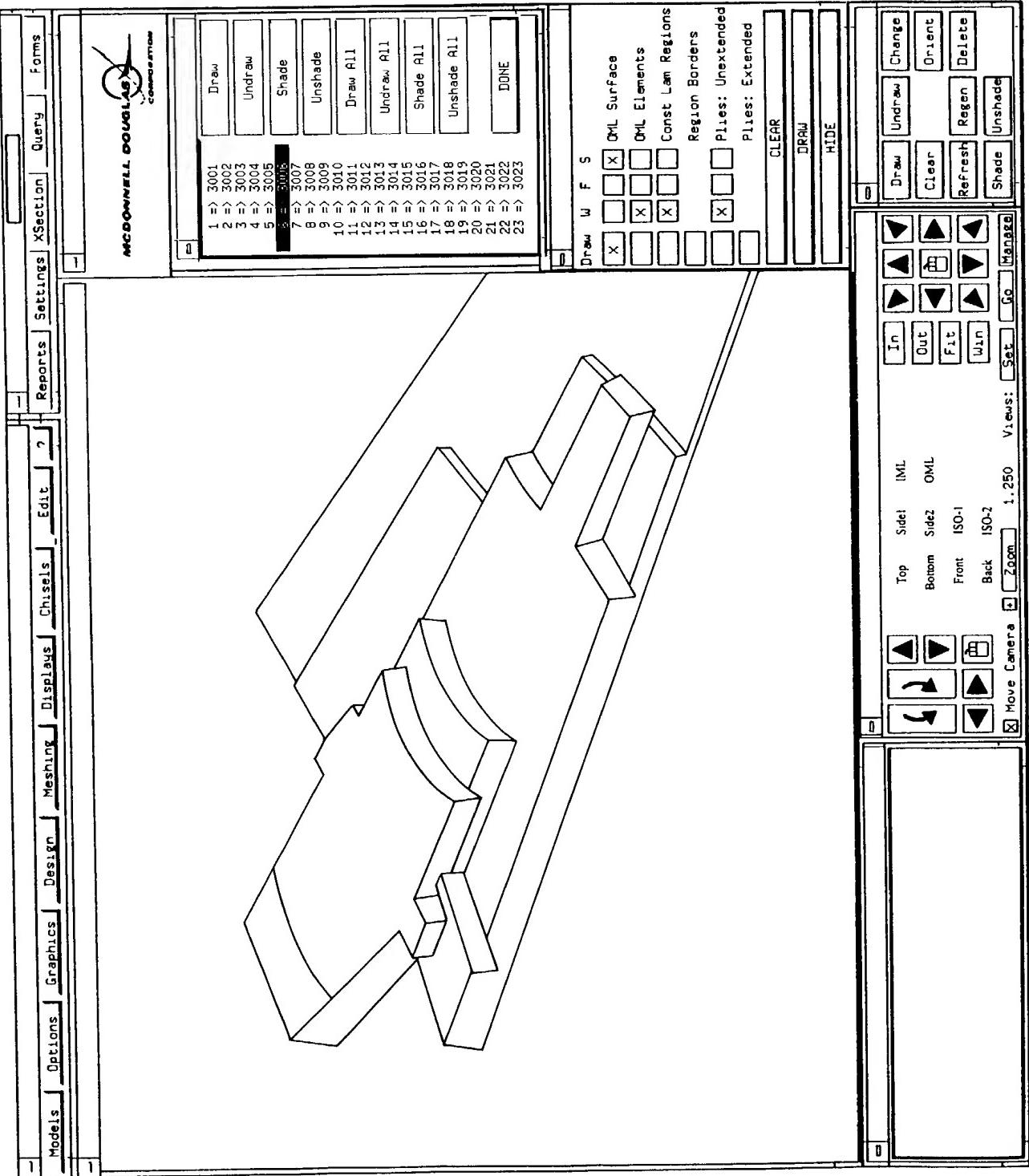


FIG. 37